ORDER NO. KM48802633C1
F1

Service Manual

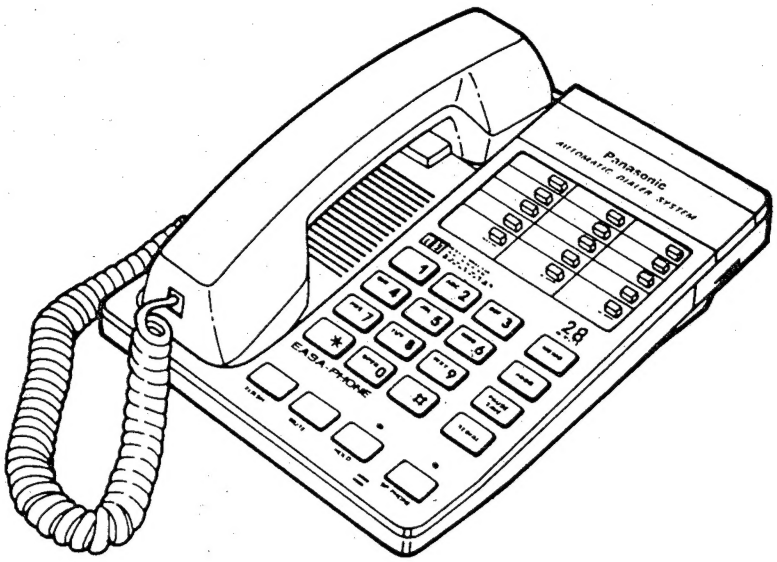
EASA-PHONE®

ITS Integrated Telephone System

and Technical Guide

Telephone Equipment

KX-T2355



■ SPECIFICATIONS

Power Source:	Telephone line voltage Battery; 4.5 V (Three "AA" Size Penlight Batteries) ... for TEL. NO. Memory (Panasonic UM-3 or equivalent)
Memory Capacity:	28 telephone numbers, up to 16 digits for each station
Dial Speed:	Tone (DTMF)/Pulse (10 pps)
Redial:	Last dialed telephone number up to 15 times in a 10 minute period
Pause:	Automatic Tone-Dial Detector
Speaker:	Unit; 6.5 cm (2.5") PM magnetic type receiver unit, 32Ω Handset; 3 cm ($1^{3}/_{16}$") Ceramic type receiver unit, 150Ω
Microphone:	Electret condenser microphone
Dimensions:	167 (W) × 70 (H) × 220 (D) mm ($6^{9}/_{16} \times 2^{3}/_{4} \times 8^{21}/_{32}$")
Weight:	1 kg (2 b 3.2 oz) with batteries

Specifications are subject to change without notice.

Panasonic

Matsushita Services Company
50 Meadowland Parkway,
Secaucus, New Jersey 07094

Panasonic Hawaii Inc.
91-238 Kauhi St. Ewa Beach
P.O. Box 774
Honolulu, Hawaii 96808-0774

Matsushita Electric of Canada Limited
5770 Ambler Drive, Mississauga,
Ontario, L4W 2T3

Panasonic Sales Company, Division of Matsushita Electric of Puerto Rico, Inc.
Ave. 65 De Infanteria, KM 9.7
Victoria Industrial Park
Carolina, Puerto Rico 00630

When you mention the serial number, write down the 11 digits. The serial number may be found on the label affixed to the bottom of the unit.

LOCATION OF CONTROLS

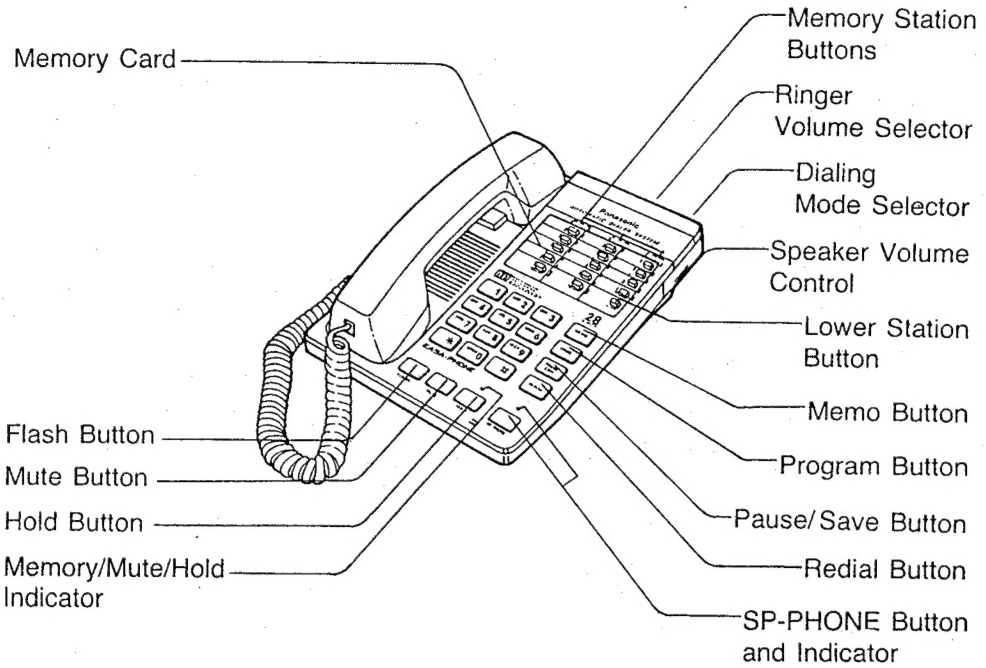


Fig. 1

DISASSEMBLY INSTRUCTIONS

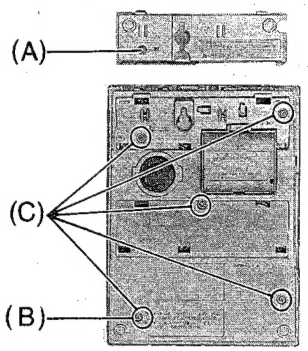


Fig. 2

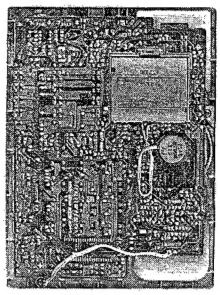


Fig. 3

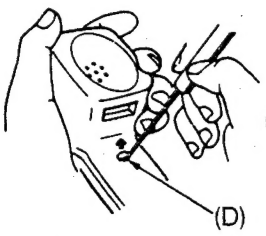


Fig. 4

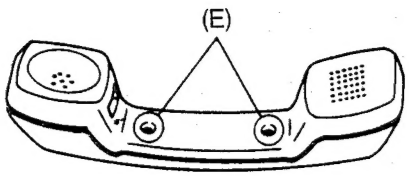


Fig. 5

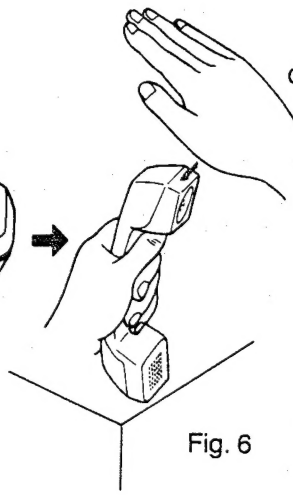
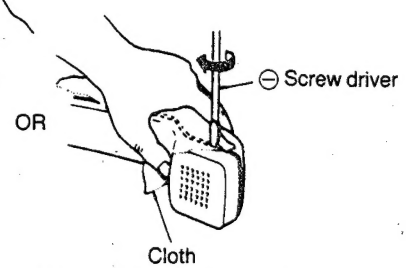
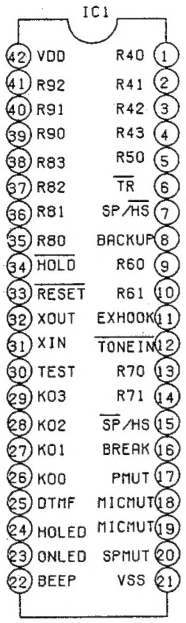


Fig. 6



Ref. No.	Procedure	Shown in Fig. –.	To remove –.	Remove
1	1	2	Stand and Cabinet cover	Stand ..... (A)
2	2	2		Sheet ..... (B)×1 (Production of from 1 set to 41000 sets)
3	1~3	2		Screws (3×12) ..... (C)×5
4	1~4	3	Printed Circuit Board	Remove the P.C. Board.
5	5~7	4	Handset Cabinet	Rubbers ..... (D)×2
6		5		Screws (3×10) ..... (E)×2
7		6		Remove the Cabinet.

Note: After tighten the screws (C) of the cabinet cover, be sure to attach the sheet (B).



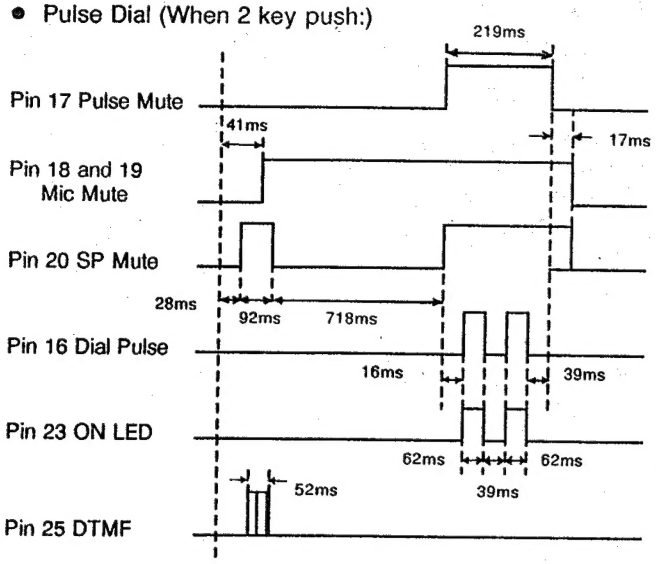
CPU DATA

IC1;	PQVI452N9681
Program ROM;	4k byte (8 bit)
Internal RAM;	768 byte (4 bit)
Counter Clock Frequency;	32.768 kHz
System Clock Frequency;	480 kHz
Power Supply Voltage;	2.2– 6.0 V

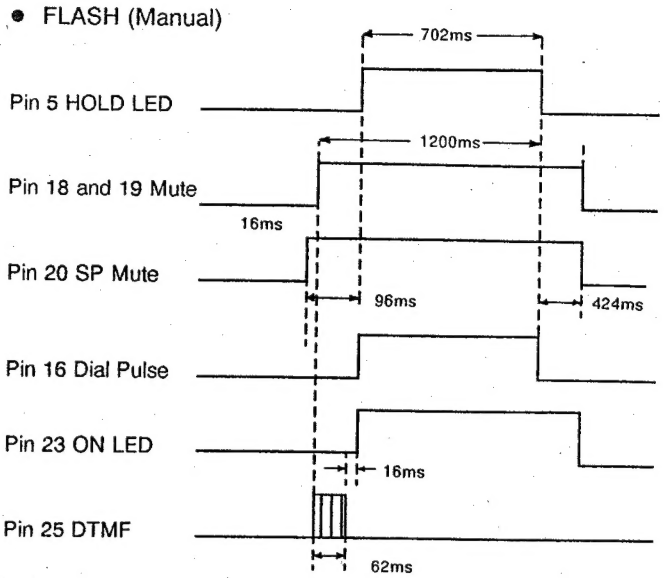
Pin No.	Mark	Function	High	Low
1	R40	Key Input	Disable	Enable
2	R41	Key Input		
3	R42	Key Input		
4	R43	Key Input		
5	R50	Key-Scan Output	Normal	Active
6	T R	Hold And SP-Phone On Output	Circuit OFF	Circuit ON
7	SP-HS	SP/HS Control Output	SP-Phone	Handset
8	Back up	Battery Backup Signal Output	——	Active
9	R60	Not Used	Normal	
10	R61	Not Used		
11	EX-HOOK	EX-HOOK Signal Input	Normal	Active
12	TONE-DETECT	Tone Detect Signal Input		
13	R70	Key-Scan Output		
14	R71	Key-Scan Output		
15	SP-HS	SP/HS Control Output	Handset	SP-Phone
16	DIAL-PULSE	Pulse Dial Output	Break	Make
17	PULSE-MUTE	Pulse Mute Control Output	ON	OFF
18	MIC-MUTE	MIC Mute Control Output		
19	MIC-MUTE	MIC Mute Control Output		
20	SP-MUTE	SP Mute Control Output		
21	Vss	GND Terminal		
22	BEEP	Key Tone Output	Key Tone Output	Normal
23	ON LED	On/Off LED Control Output	OFF	ON
24	HOLD LED	HOLD LED Control Output		
25	DTMF-OUT	DTMF Signal Output	Active	Normal
26	K00	Key Input	Disable	Enable
27	K01	Key Input		
28	K02	Key Input		
29	K03	Key Input		
30	TEST	Not Used		
31	X IN	System Clock		
32	X OUT	System Clock		
33	Reset	System Reset Signal	Normal	Reset
34	HOLD	Line Power Input	Normal	Active
35	R80	Key-Scan Output		
36	R81	Key-Scan Output		
37	R82	Key-Scan Output		
38	R83	Key-Scan Output		
39	R90	Key-Scan Output		
40	R91	Key-Scan Output		
41	R92	Key-Scan Output		
42	VDD	⊕ Power Source Terminal		

Timing Chart of CPU

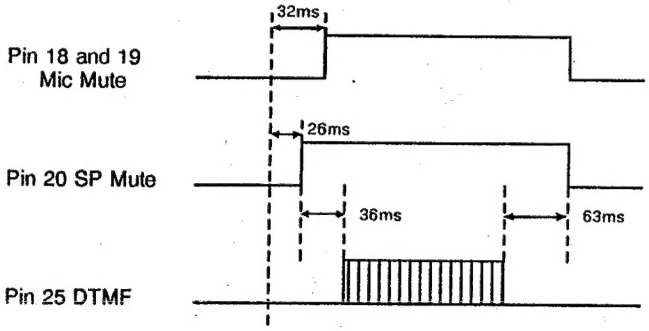
- Pulse Dial (When 2 key push:)



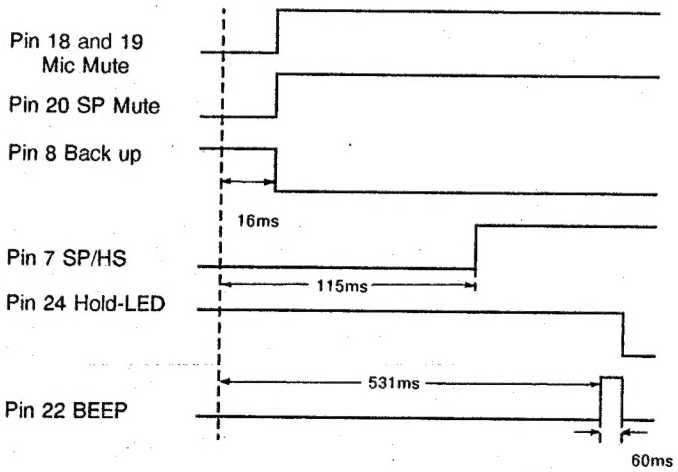
- FLASH (Manual)



- DTMF Dial (Manual)



- Program



Circuit Operation:

- Pin 1~4 are the Hook SW, Tone/Pulse SW Data input Port.
- Pin 5 and 35~38 output the scanning signal to the Dial, Flash, Redial, Hold, Pause, Hook SW and Tone/Pulse SW.
- Pin 6 outputs the Hold and Speakerphone Signal.
  (High ··· Hold and Speakerphone OFF, Low ··· Hold and Speaker Phone ON)
- Pin 7 outputs the speakerphone/Handset Selector Signal.
  (High ··· Speakerphone, Low ··· Handset)
- Pin 8 outputs the signal for the battery backup when off-hook. During back up, its output is a Low level.
- Pin 11 inputs the EX-HOOK detect signal. When inputting the EX-HOOK detect signal, its input is a Low level.
- Pin 12 inputs the Tone detect signal. When inputting the Tone detect signal, its input is a Low level.
- Pin 13~14, 39~41 are output the scanning signal to the station-key, Lower, Mute MEMO key.
- Pin 15 outputs the speakerphone/Handset Selector Signal. (High ··· Handset, Low ··· Speakerphone.)
- Pin 16 is an output to control the Make/Break of the pulse. During Break, its output is a High level.
- Pin 17~20 are the muting control signals. During muting, its output is a high level.
- Pin 22 is the terminal for the audible tone signal output.
- Pin 23 and 24 output the Hold, and ON/OFF LED indicators. While the LED lights, the outputs, are at a low level.
- Pin 25 is the terminal for the D/A change and the DTMF signal output.
- Pin 26~29 are the key data input port.
- Pin 31 and 32 are the terminal to produce the system clock of CPU.
- Pin 33 inputs the reset signal to CPU. When reset its input is a low level.
- Pin 34 inputs the stand by signal to IC.When stand by, inputs low level.
- Pin 42 is the ⊕ power supply input of the CPU.

BLOCK DIALGRAM

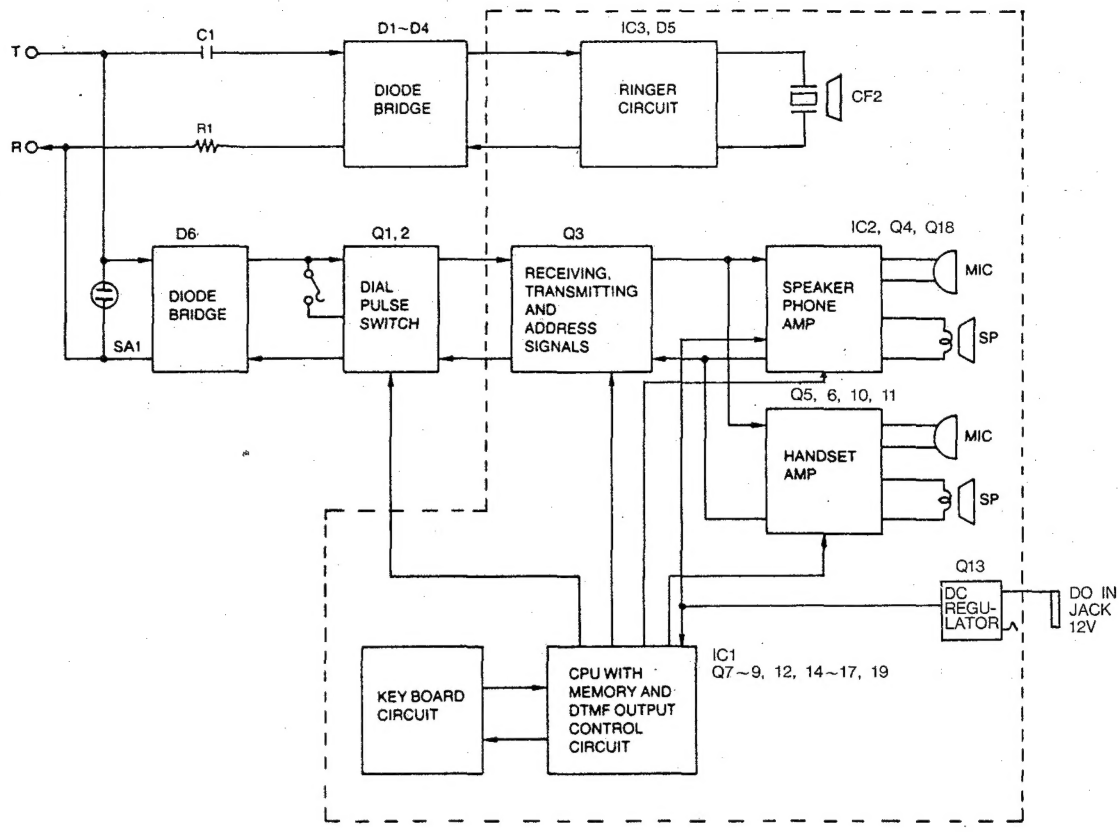


Fig. 7

CIRCUIT OPERATIONS

■ TELEPHONE LINE INTERFACE and PULSE DIAL CIRCUIT

When the hook switch SW1 is ON (off-hook), the circuit is closed, and current is supplied to the base of Q2 via the diode bridge D6~9 and Q2 is On→ Q1 is ON (OFF-HOOK condition).
Q1 and Q2 are the dial palse generating circuits, and are driven by the CPU (IC1), when the CPU Pin 8 of IC1 is HIGH→ Q8 is ON→ Q2 is OFF and Q1 is OFF. (break)
If port Pin 8 is LOW→ Q8 is OFF→ Q2 is ON→ Q1 is ON. (make)

Circuit Diagram ... See page 7

■ RINGER CIRCUIT

Circuit Operation:
The bell signal passes through C1 (R1)→ diode bridge, supplying power to pin 1 of IC2.

The ring signal is outputted from Pin 8 of IC2, and its volume is adjusted in adjusted in 3 steps (H-L-OFF) by SW4 then impressed on the ceramic sound generator, and so is generated.

R2 ..... Bell sensitivity adjustment
R4, C4 ..... Bell frequency setting fH1, fH2
R3, C3 ..... Repeat frequency setting fL

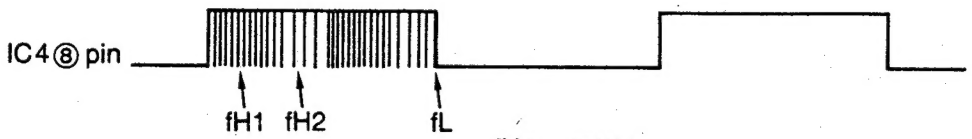
fH1, fH2, fL are derived from the following formulas:

$$fH1 = \frac{1}{1.515 \times R4 \times C4} = 671\text{Hz} \qquad fL = \frac{1}{1.234 \times R3 \times C3} = 11.1\text{Hz}$$

R4 = 120k C6=0.0082μF R3 = 330k C3=0.22μF R2 = 10k

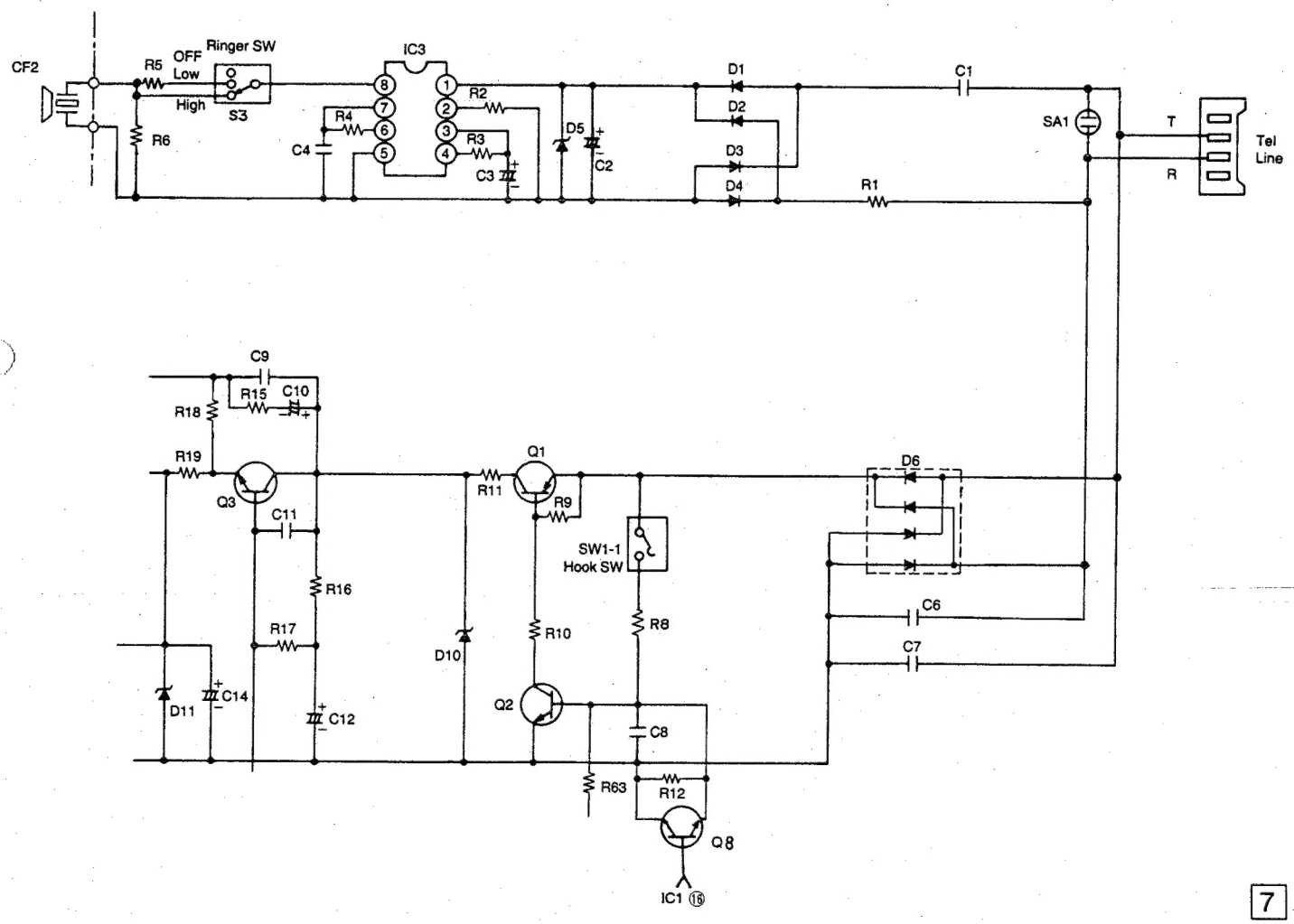
The following shows the waveform of the tone ringing IC output:

The following shows the waveform of the tone ringing IC output:



fH1 = 671Hz
fH2 = 832Hz
fL = 11.2Hz

Circuit Diagram



■ TONE DIAL CIRCUIT

Function:
The tone dialing circuit consists of a DTMF (Dual Tone Multi Frequency) signal generator (outputted from Pin 25 of the microprocessor) for tone dialing, and also a circuit for outputting the signal to the line.
The DTMF circuit identifies inputs from the 12 keys (1,2,3,4,5,6,7,8,9,0,*and #) by means of a total of seven frequencies, that is four low frequencies (Low group) and three high frequencies (High group).

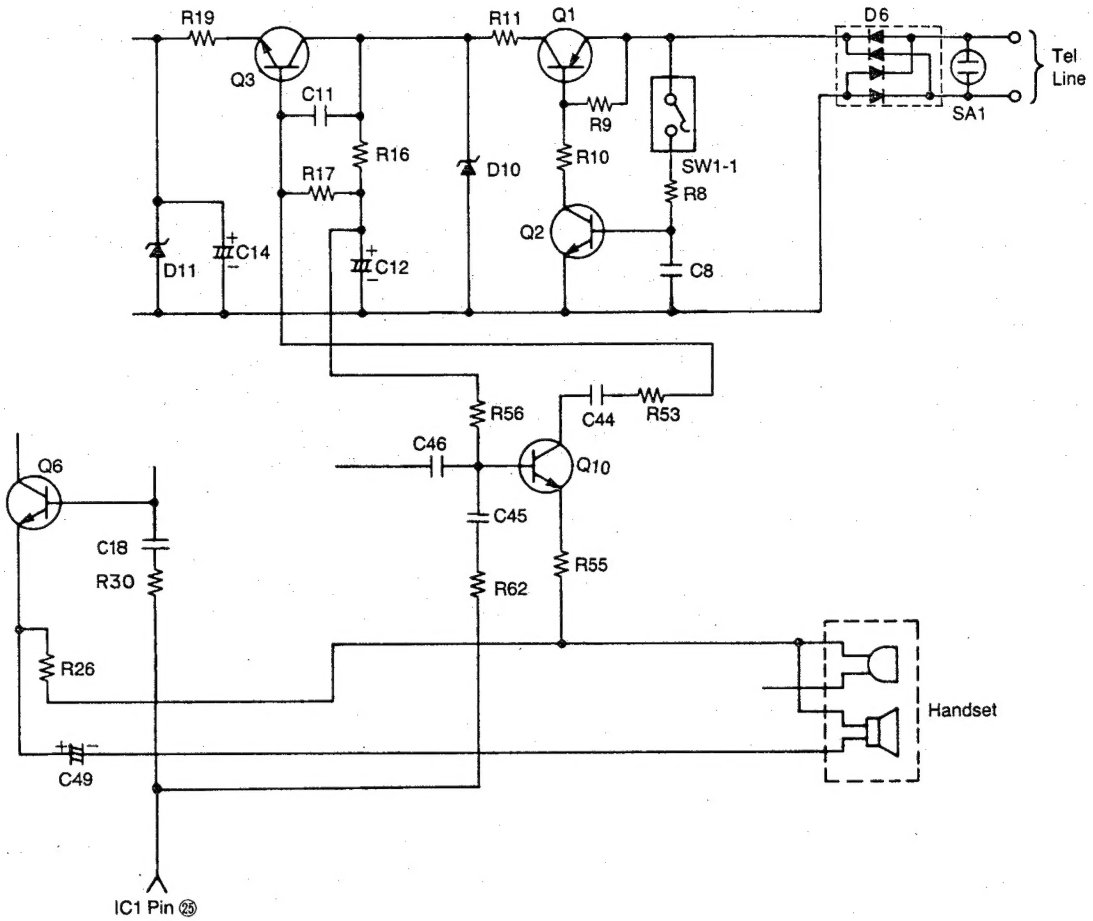
Circuit Description:
When a dial key is pressed, a DTMF signal is outputted from Pin 25 of IC1 as an analog synthetic wave.
The signal flow to the line is as follows.
Pin 25 of IC1→ R62, C45→ Q10 base→ Q10 collector→ C44, R53→ Q3 base→ Q3 collector→ R11→ Q1 collector→ Q1 emitter→ Diode bridge (D6)→ TEL. Line.
The DTMF signal is sent to the line via the following path.
Q10 amplifies the DTMF signal.
Q3 is an amplifier which is used to output the signal to line.
Shown below is the signal flow used to output the DTMF signal from the handset as a monitor tone when a dial key is pressed.
Pin 25 of IC1→ R30, C18, C35→ Q6 base→ Q6 emitter→ C49→ Handset Speaker.
The signal combination and frequency corresponding to each dial key is shown below.

High Group / Low Group	H1	H2	H3
L1	1	2	3
L2	4	5	6
L3	7	8	9
L4	*	0	#

Tone Frequencies

Low Group	Frequencies	High Group	Frequencies
L1	697 Hz ± 1.5%	H1	1209 Hz ± 1.5%
L2	770 Hz ± 1.5%	H2	1336 Hz ± 1.5%
L3	852 Hz ± 1.5%	H3	1477 Hz ± 1.5%
L4	941 Hz ± 1.5%		

Circuit Diagram

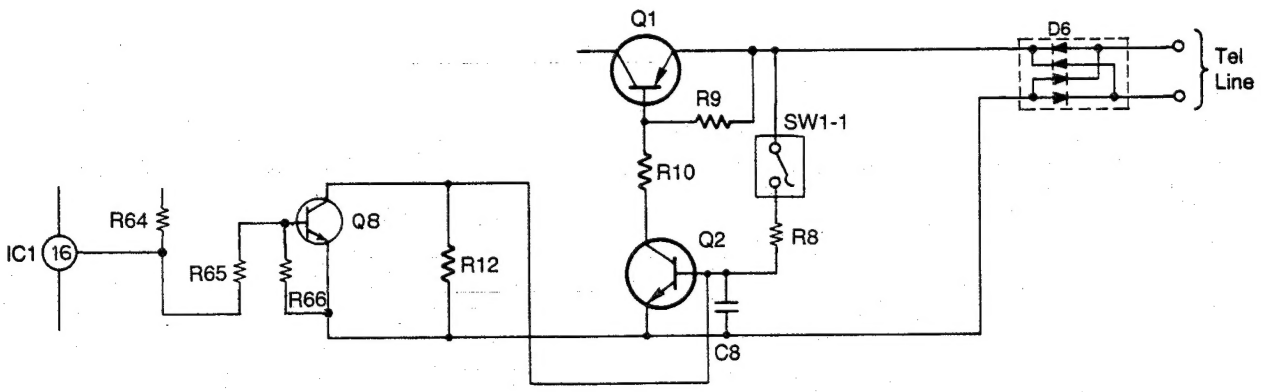


■ PULSE DIAL CIRCUIT

Circuit Operation:

The dial pulses are generated by the CPU (IC1), and reach the telephone line via the following path; Pin 16 of IC1→R65→Q8→Q2→Q1→Telephone Line.

Circuit Diagram



■ SPEAKERPHONE CIRCUIT

Function:
This circuit controls the automatic switching of the transmitted and received signals, to and from the telephone line, when the unit is used in the hands-free mode.

Circuit Operation:
The Speakerphone can only provide a one-way communication path.
In other words, it can either transmit an outgoing signal or receive an incoming signal at a given time, but cannot do both simultaneously. Therefore, a switching circuit is necessary to control the flow of the outgoing and incoming signals. This switching circuit is contained in IC2 and consists of a Voice Detector, Tx Attenuator, Rx Attenuator, Comparator and Attenuator Control. The circuit analyzes whether the Tx (transmit) or the Rx (receive) signal is louder, and then it processes the signals such that the louder signal is given precedence.
The Voice Detector provides a DC input to the Attenuator Control corresponding to the Tx signal.
The Comparator receives a Tx and a Rx signal, and supplies a DC input to the Attenuator Control corresponding to the Rx signal. The Attenuator Control provides a control signal to the Tx and the Rx Attenuator to switch the appropriate signals on and off. The Attenuator Control also detects the level of the volume control to automatically adjust for changing ambient conditions.

1) Transmission Signal Path
The input signal from the microphone is sent through the circuit via the following path:
- Mic→ Pin 9 of IC2→Pin 10 of IC2→Pin 3 of IC2→Pin 4 of IC2→Interface (Q3)→Telephone Line.

2) Reception Signal Path
Signals received from the telephone line are outputted at the speaker via the following path:
- Telephone Line→Interface (Q3)→receive amp (Q18)→Pin 27 of IC2→Pin 26 of IC2→Pin 19 of IC2→Pin 15 of IC2→Speaker.

3) Control Signal Path
Control signals for transmission and reception are inputted to IC2 via the following path:
(Transmission Control Signal Path)
- Mic→Pin 9 of IC2→Pin 10 of IC2→Pin 3 of IC2→Pin 4 of IC2→Pin 5 of IC2.

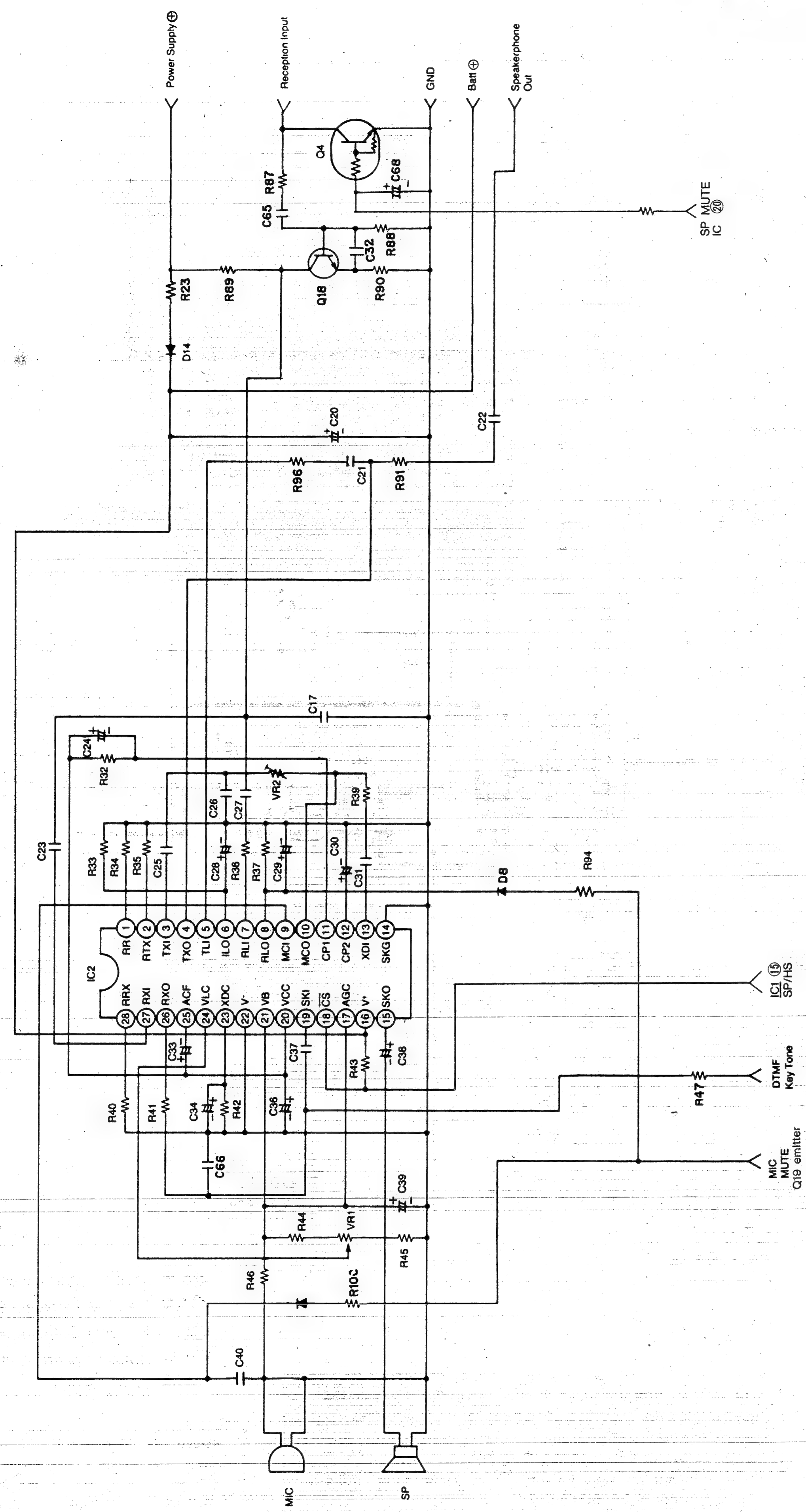
(Reception Control Signal Path)
- Telephone Line→Interface (Q3)→Receive Amp (Q18)→Pin 7 of IC2.

4) Transmission/Reception Switching
The comparison result between Rx and Rx outputs as a DC level of IC2 pin 25.
Tx level is high . . . . . Pin 25 = Pin 20—6 mV
Rx level is high . . . . . Pin 25 = Pin 20—150 mV
Comparator output is connected to the attenuator control inside of IC2.

5) Voice Detector
The output of the mic amp (Pin 10 of IC2) is supplied to Pin 13 of IC2 as a control signal for the voice detector.

6) Attenuator Control
The attenuator control detects the setting of the volume control through Pin 24 of IC2 to automatically adjust for changing ambient conditions.

Circuit Diagram



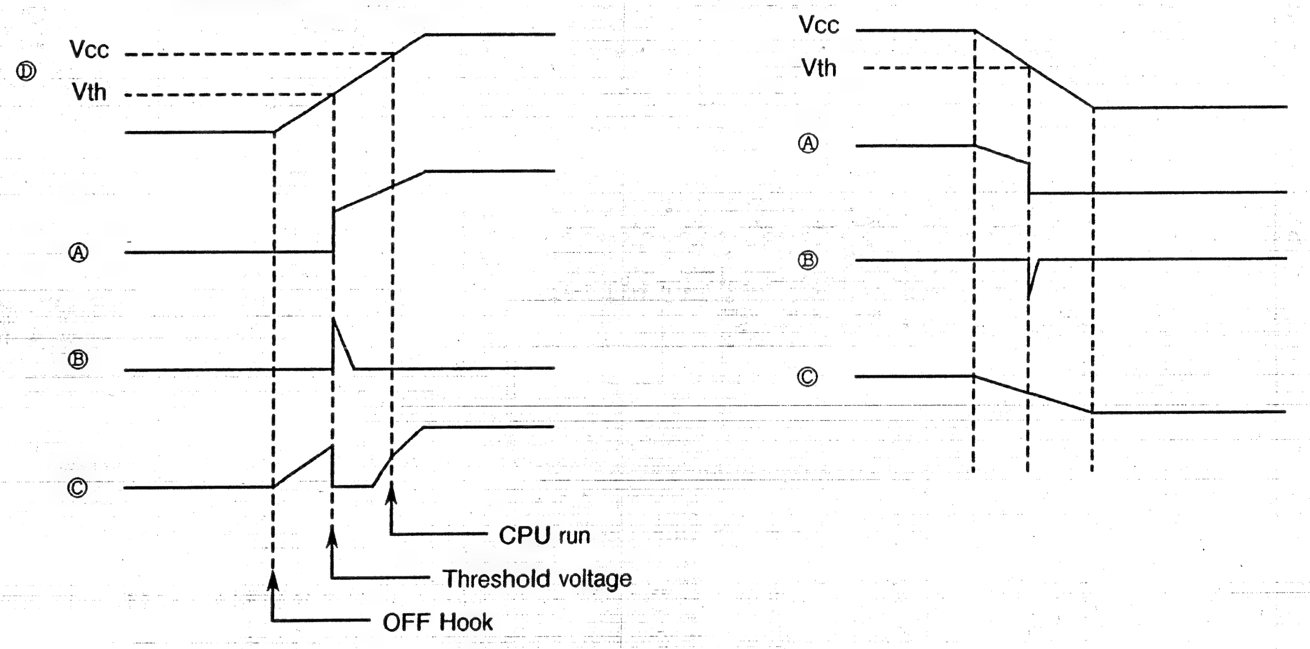
■ RESET CIRCUIT

Functions:
The reset circuit is a detection circuit which is used to detect the power supply voltage and apply a reset to the microprocessor (IC1) when the circuit changes from an ON status to an OFF-HOOK status.

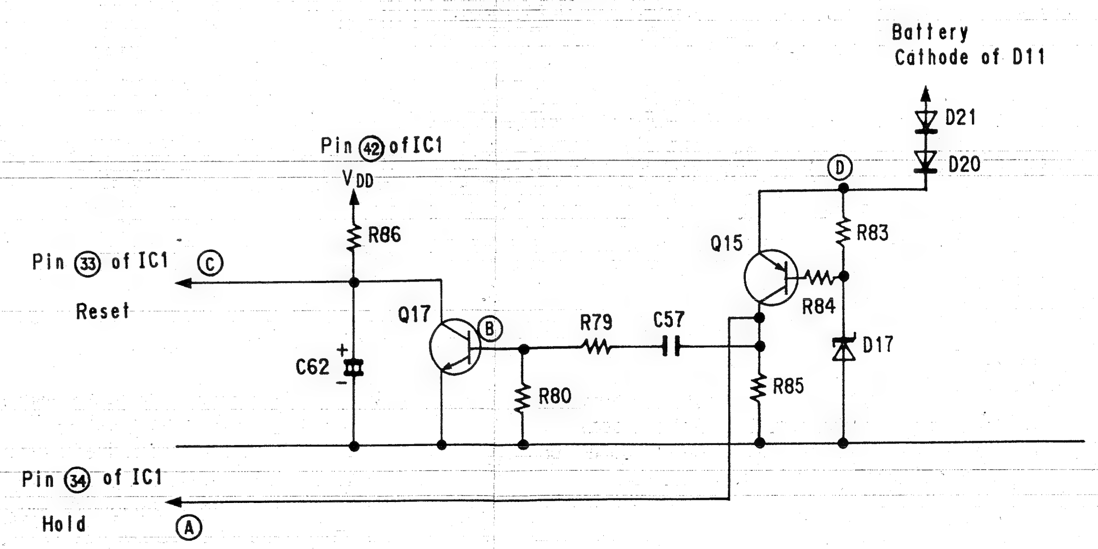
Circuit Operation:
When the set is changed from an ON HOOK to an OFF HOOK status:
(The timing chart is indicated by points Ⓐ, Ⓑ, Ⓒ, and Ⓓ.)
The set is OFF HOOK, and the voltage at point Ⓓ rises until it reaches the rest voltage level, Vth, then D19 goes ON→ Q15 goes ON→ Q17 goes ON→ pointⒸmomentarily becomes LOW level, causing a reset to be applied to the microprocessor (IC1).
When the set is put into an ON HOOK status:
The voltage at point D falls until it reaches the reset voltage Vth, then D19 goes OFF→ Q15 goes OFF→ point Ⓐ becomes LOW level, causing a HOLD signal to be applied to the microprocessor. As a result, the operation of the microprocessor stops, the current consumption is reduced, and the contents of the memory are backed up by the batteries.

Timing Chart

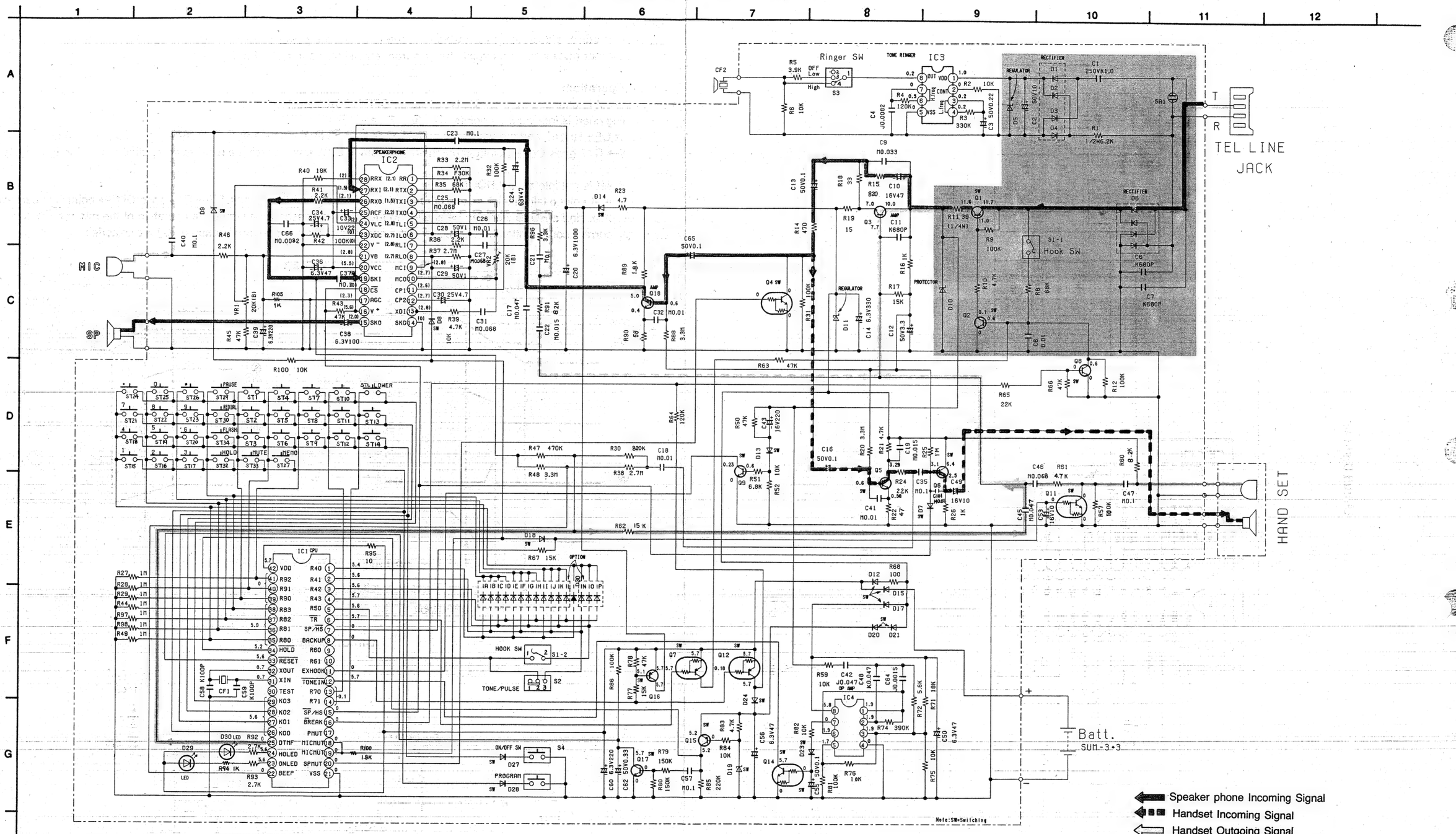
(1) At the off-hook condition. (2) At the on-hook condition.



Circuit Diagram



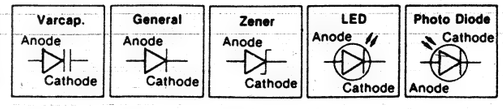
SCHEMATIC DIAGRAM



Speaker phone Incoming Signal
Handset Incoming Signal
Handset Outgoing Signal
Speaker phone Outgoing Signal
DTMF Signal

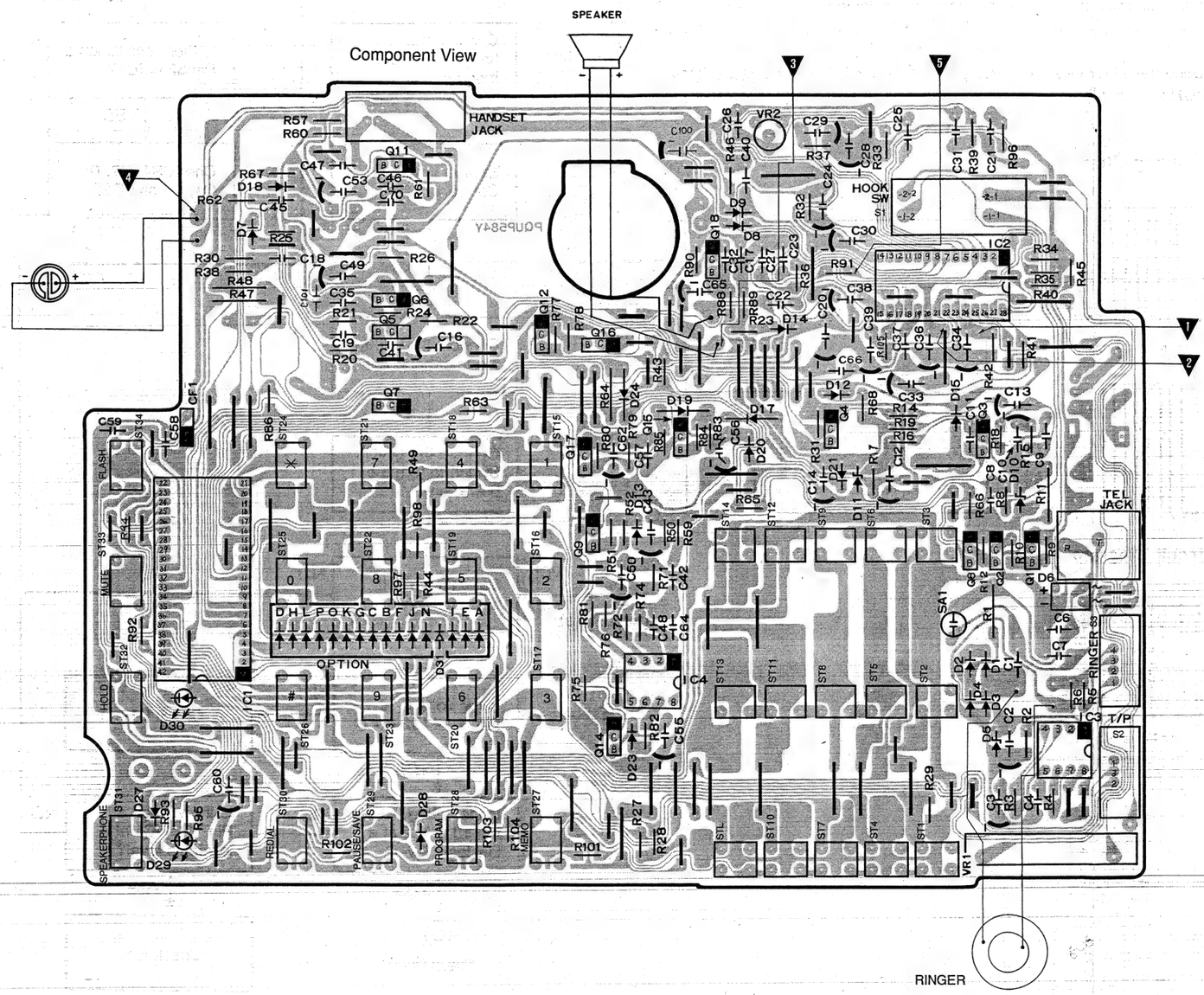
Notes:

1. SW1-1: Hook switch in "ON-HOOK" position.
2. SW1-2: Hook switch in "ON-HOOK" position.
3. SW2: Tone/Pulse selector switch in "TONE" position.
4. SW3: Ringer Switch in "HIGH" position.
5. DC voltage measurements are taken with electronic voltmeter from negative terminal of battery.
   (Add 40 mA to telephone line from the loop simulator.)
   No Mark: Handset Mode
   ( ): Speakerphone On Mode
6. This schematic diagram may be modified at any time with the development of new technology.
7. **Important safety notice**
   The shaded area on this schematic diagram incorporates special features important for protection from fire and electrical shock hazards.
   When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

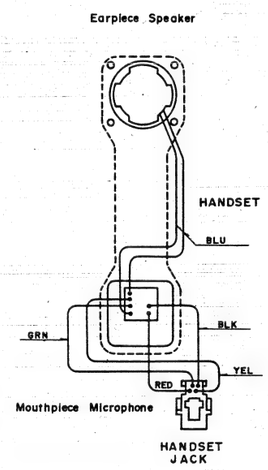


CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM

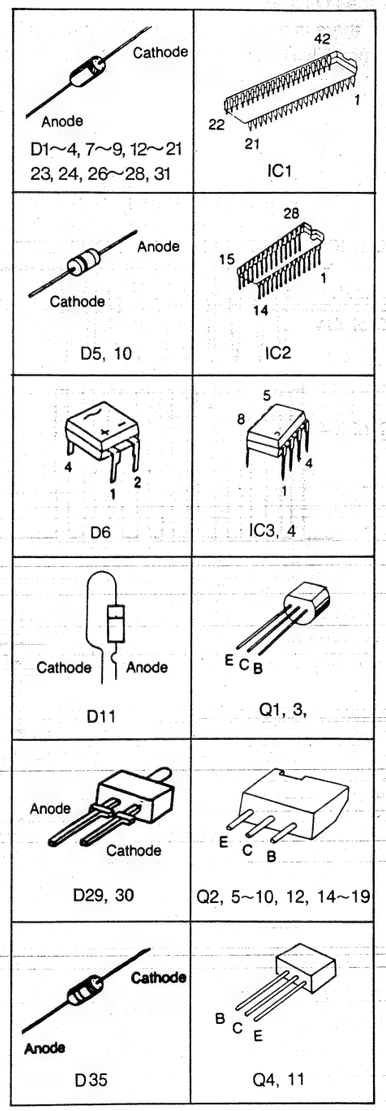
Component View



Earpiece Speaker



TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES



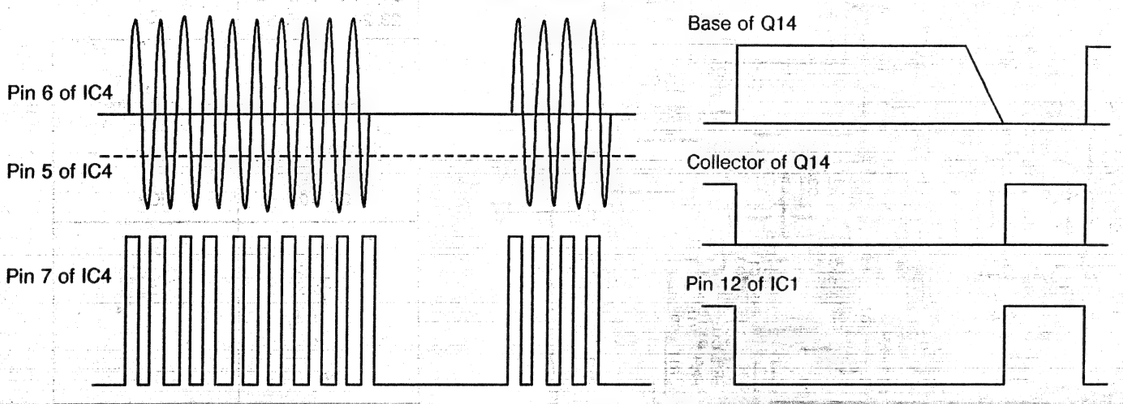
Note:
This circuit board may be modified at any time with the development of new technology.

■ TONE DETECTION CIRCUIT

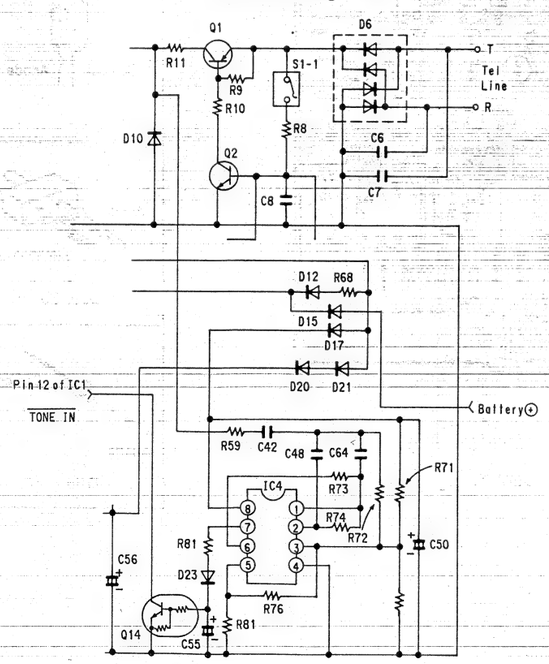
Function:
This circuit is used to sense the status of the line (busy tone or dial tone) during Auto PAUSE or Auto Redial.

Circuit Description:
The signal from the line passes through the path D6→ Q1→ R11→ R59→ C42→ C48, and is then input to pin 2 of IC4. Here the dial tone or busy tone alone is extracted and output from pin 1 of IC4. It is then input to pin 6 of IC4 and compared with the level at pin 5 of IC4. When a busy tone or dial tone is input, pin 7 of IC4 becomes HIGH logic level. This level passes through D15, and is smoothed by C55→ Q14 goes ON→ collector of Q14 becomes LOW logic level→ pin 12 of IC1 becomes LOW logic level.
When there is not busy tone or dial tone, pin 7 of IC4 becomes LOW logic level→ D23→ Q14 goes OFF→ collector of Q14 becomes HIGH logic level→ pin 12 of IC1 becomes HIGH logic level.

Timing Chart

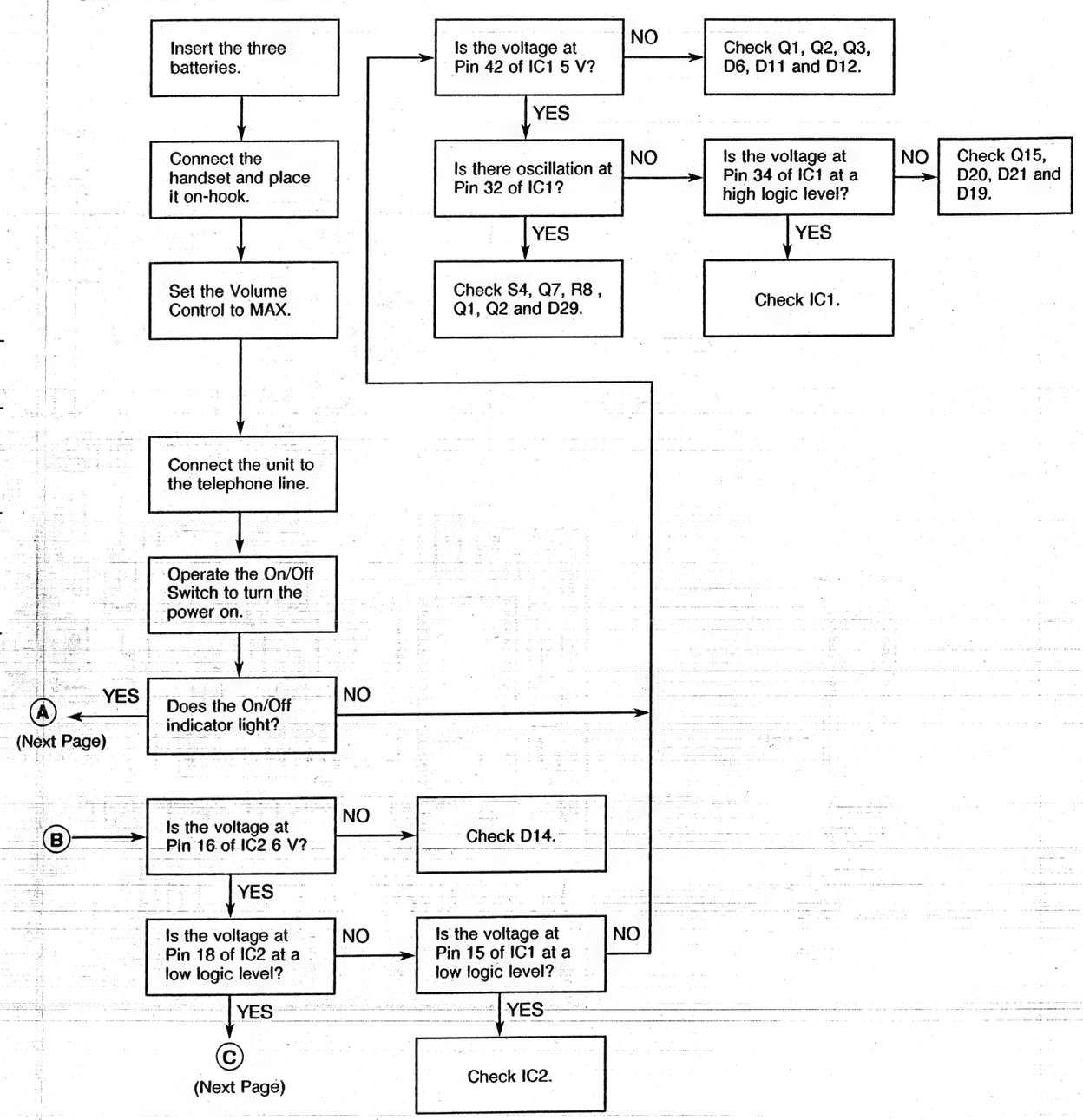


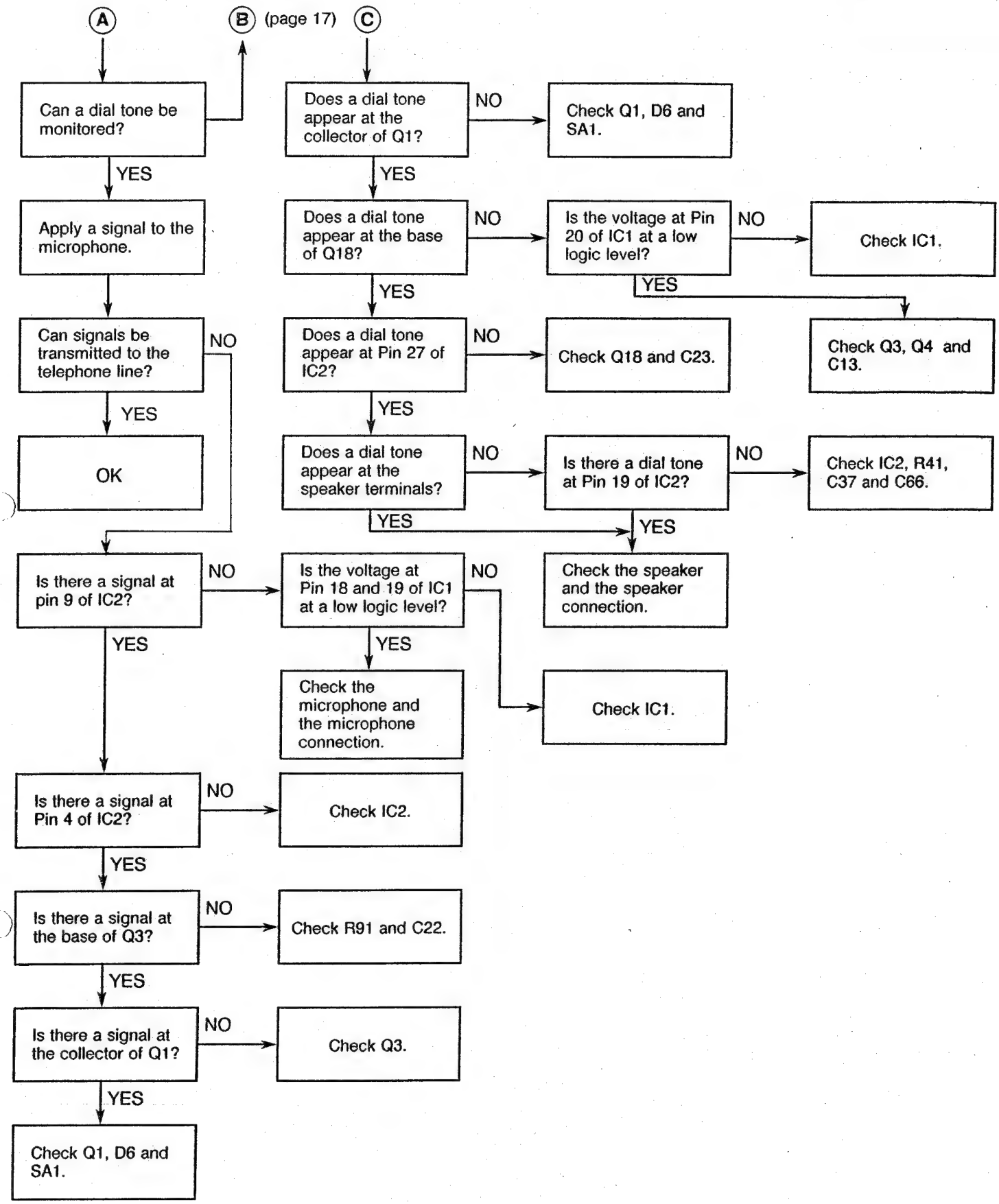
Circuit Diagram



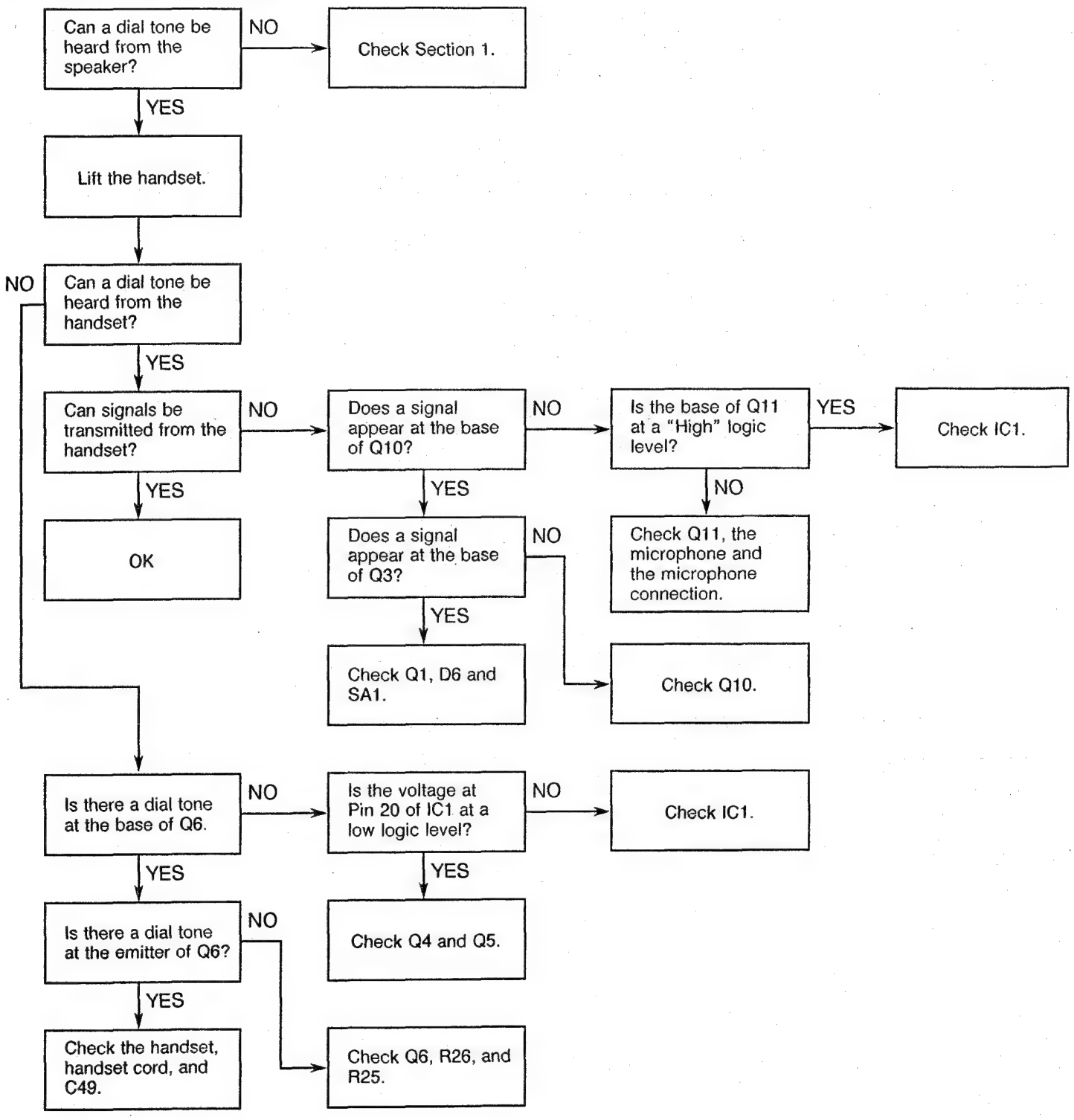
TROUBLE SHOOTING GUIDE

1. UNIT DOES NOT TURN ON

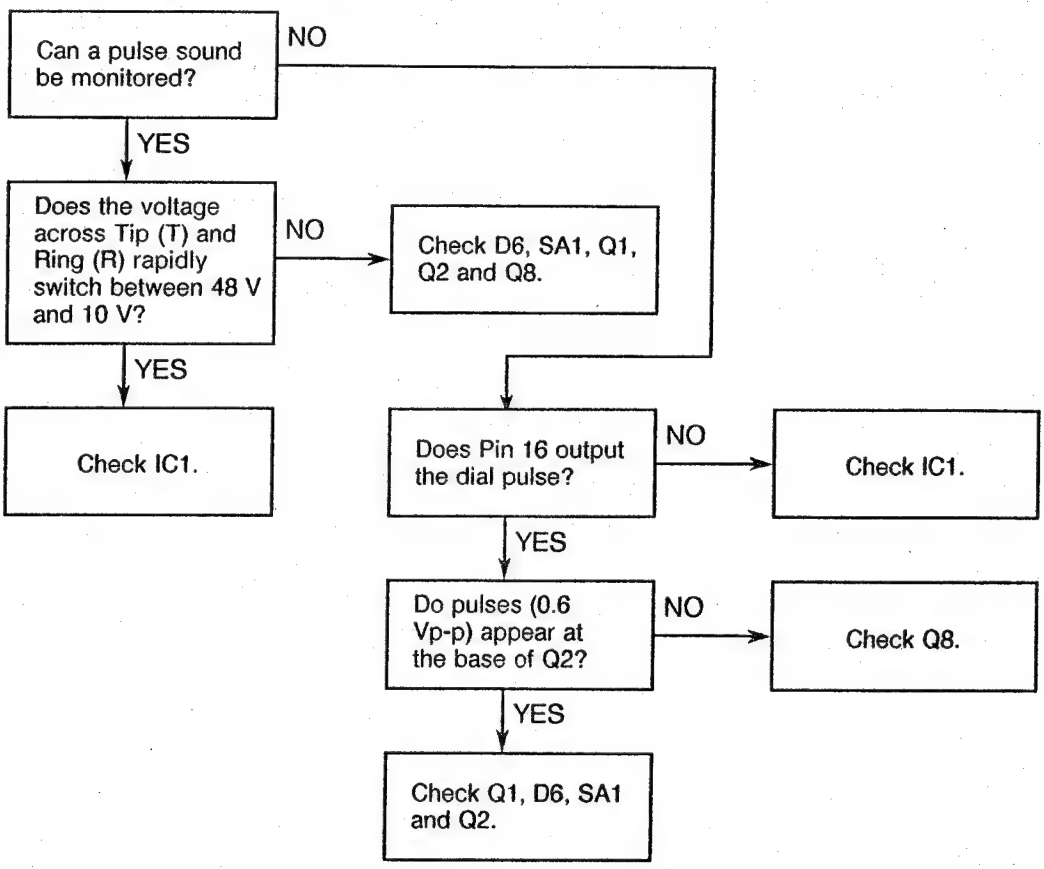



A
B (page 17)
C
Can a dial tone be monitored?
YES
Apply a signal to the microphone.
Can signals be transmitted to the telephone line?
NO
YES
OK
Is there a signal at pin 9 of IC2?
NO
YES
Is there a signal at Pin 4 of IC2?
NO
YES
Check IC2.
Is there a signal at the base of Q3?
NO
YES
Check R91 and C22.
Is there a signal at the collector of Q1?
NO
YES
Check Q3.
Check Q1, D6 and SA1.
Does a dial tone appear at the collector of Q1?
NO
YES
Check Q1, D6 and SA1.
Does a dial tone appear at the base of Q18?
NO
YES
Is the voltage at Pin 20 of IC1 at a low logic level?
NO
YES
Check IC1.
Check Q3, Q4 and C13.
Does a dial tone appear at Pin 27 of IC2?
NO
YES
Check Q18 and C23.
Does a dial tone appear at the speaker terminals?
NO
YES
Is there a dial tone at Pin 19 of IC2?
NO
YES
Check IC2, R41, C37 and C66.
Is the voltage at Pin 18 and 19 of IC1 at a low logic level?
NO
YES
Check the microphone and the microphone connection.
Check IC1.
Check the speaker and the speaker connection.

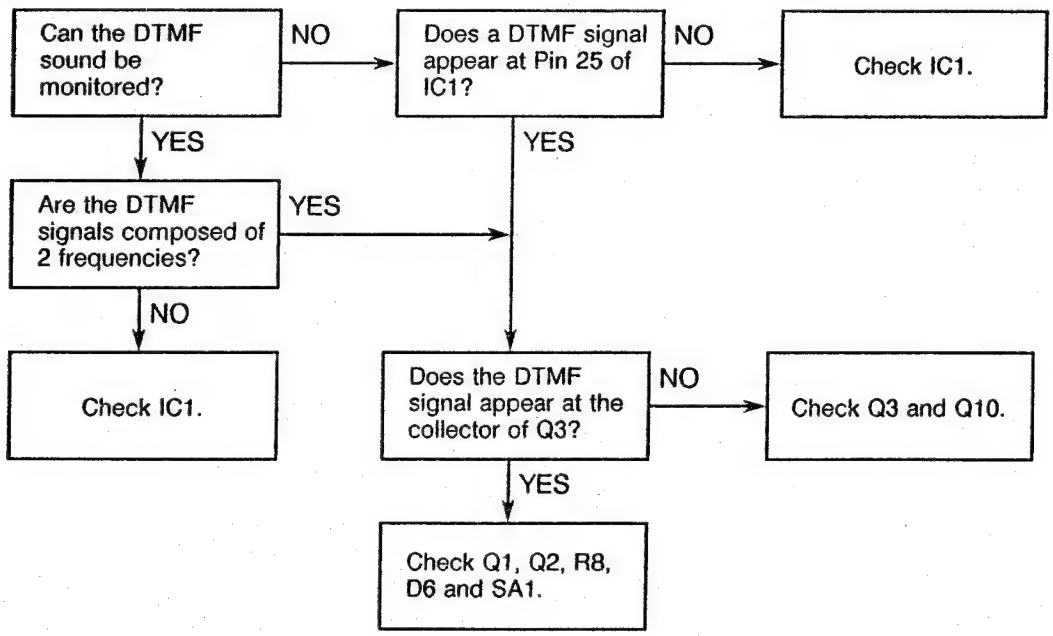
2. PROBLEMS WITH THE HANDSET



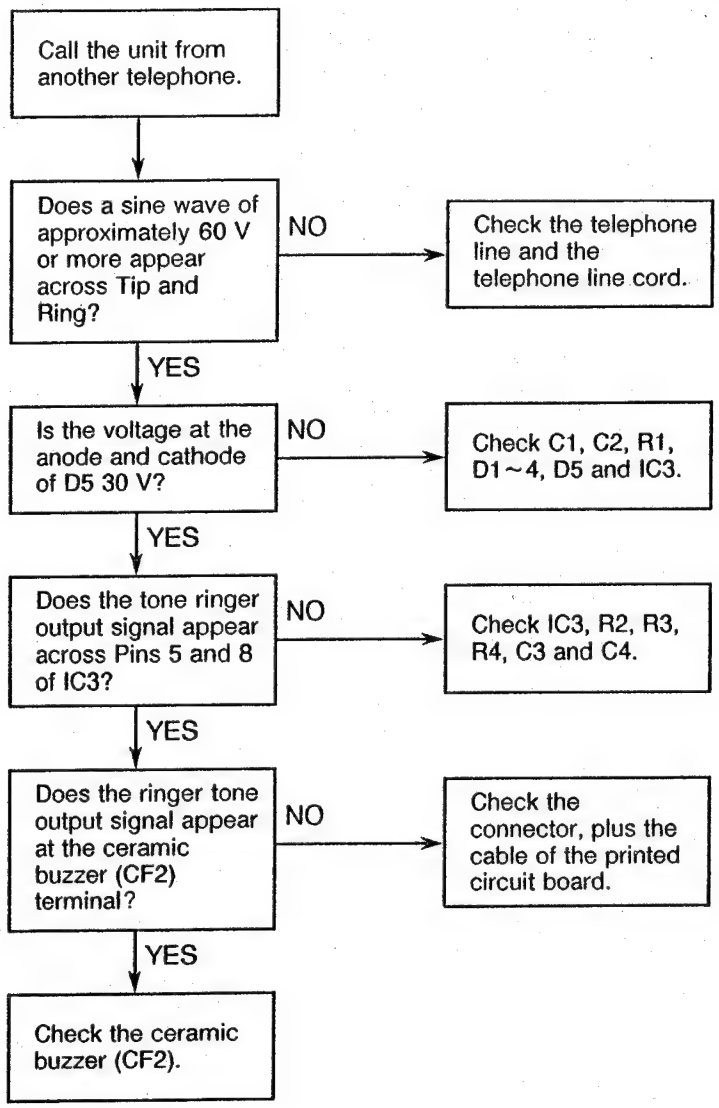
3. PULSE DIALING PROBLEMS



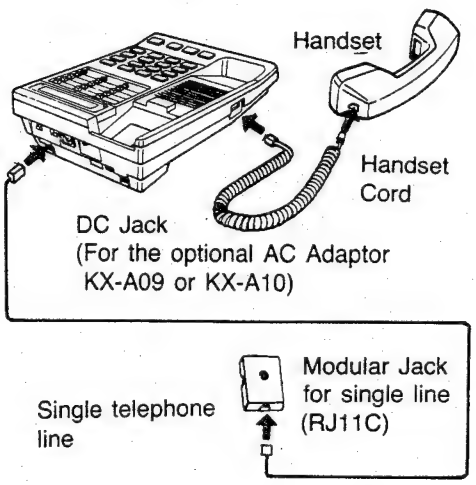
4. TONE DIALING PROBLEMS



5. NO "RINGING" SOUND WHEN A RING SIGNAL IS INPUT



CONNECTION



IC BLOCK DIAGRAM

IC2 PQVISC77655S

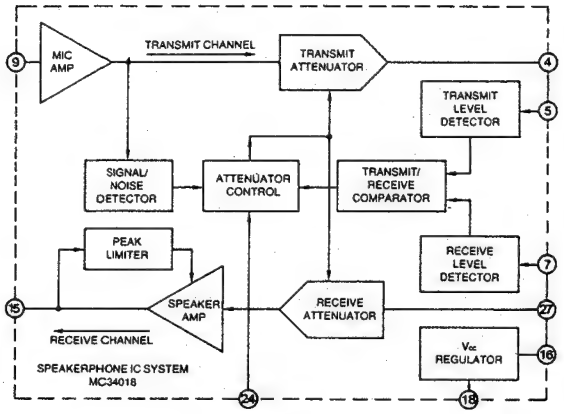


Fig. 8

IC3 PQVIIR3N34A

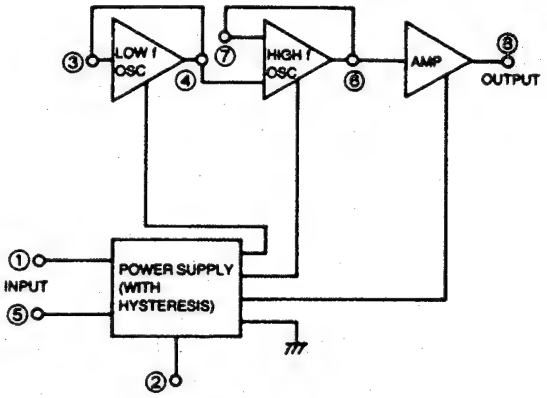


Fig. 9

ADJUSTMENT

Perform the following adjustment after replacing IC2 and VR2.

Test Equipment:

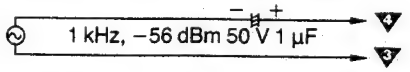
Loop Simulator
RC Oscillator
VTVM

Preparation:

1. Set the unit's controls as follows:
   A. SP-PHONE SWITCH—"ON"
   B. VOLUME CONTROL—"MAX"
2. Connect Test Points ▼-▼.
3. Set the variable resistor of the loop simulator to maximum resistance (fully counterclockwise).
4. Connect the unit to the loop simulator.
5. Make adjustment in a quiet room.
6. After adjustment are made, disconnect Test Points ▼-▼

Transmission Level:

1. Set the loop simulator selector switch to "TX".
2. Connect the RC Oscillator to Test Point ▼(−)-▼(+), and connect an electrolytic capacitor (50 V, 1 µF) as shown below.
3. Set RC Oscillator to 1 kHz, −56 dBm.



4. Connect the VTVM to Test Points ▼ (−) - ▼ (+).
5. Adjust VR2 for a reading of −23 dBm ±0.5 dB on the VTVM.

Please refer to Circuit Board and wiring Connection Diagram which is located test points (▼).

Schematic Diagram of Loop Simulator

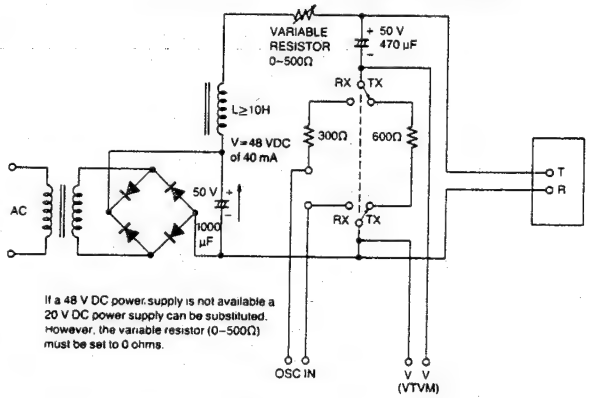


Fig. 10

HANDSET PARTS LOCATION

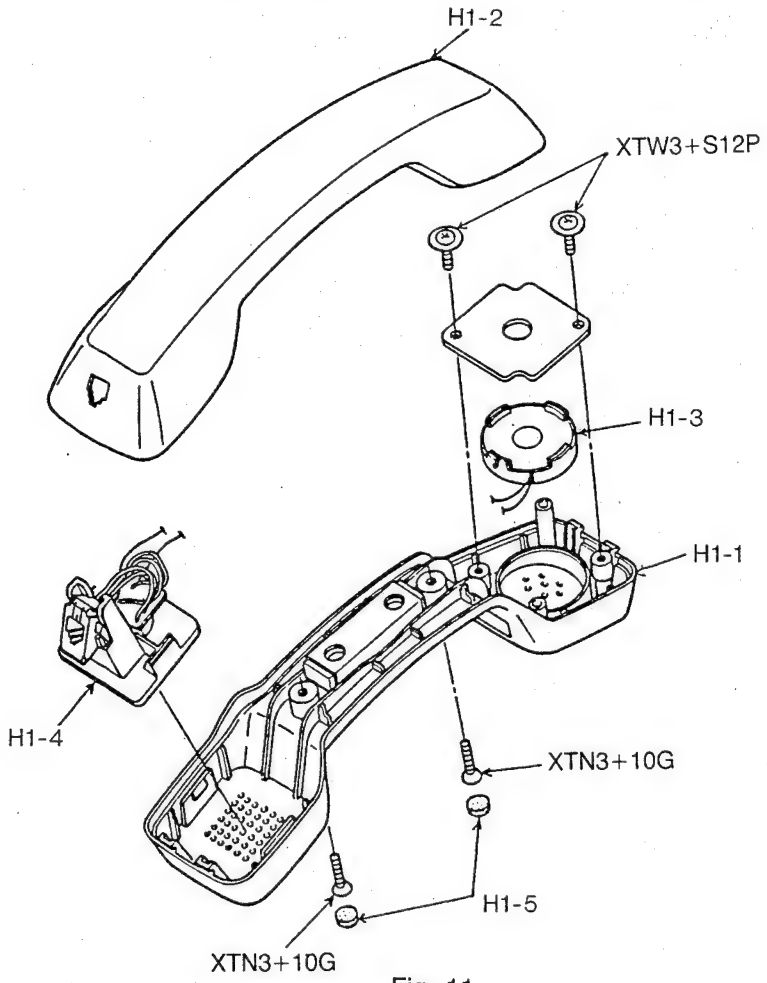


Fig. 11

ACCESSORIES & PACKING MATERIALS

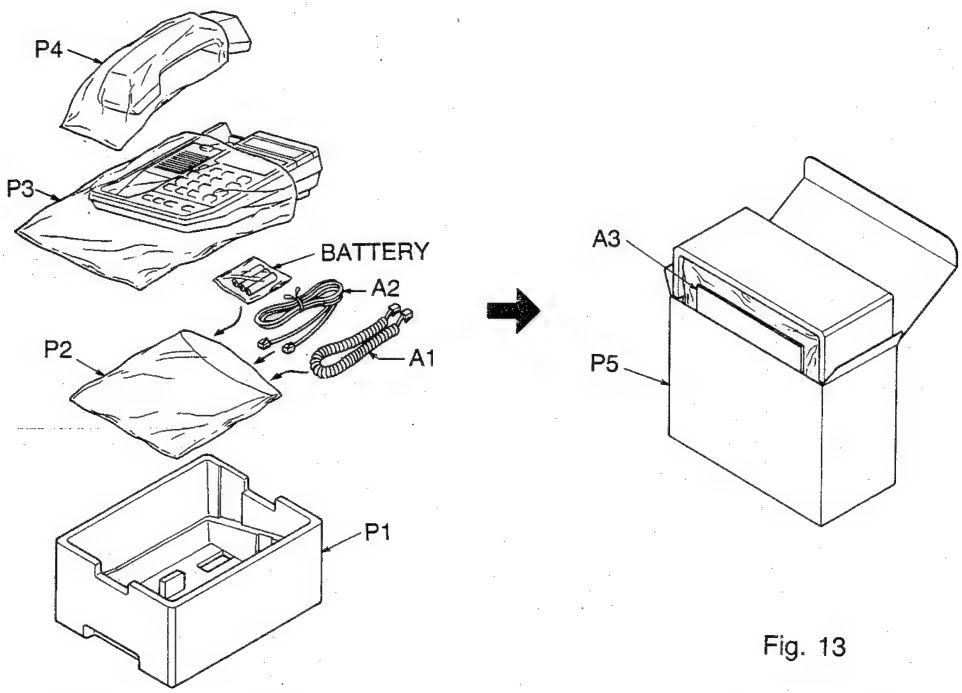


Fig. 12

Fig. 13

CABINET AND ELECTRICAL RARTS LOCATION

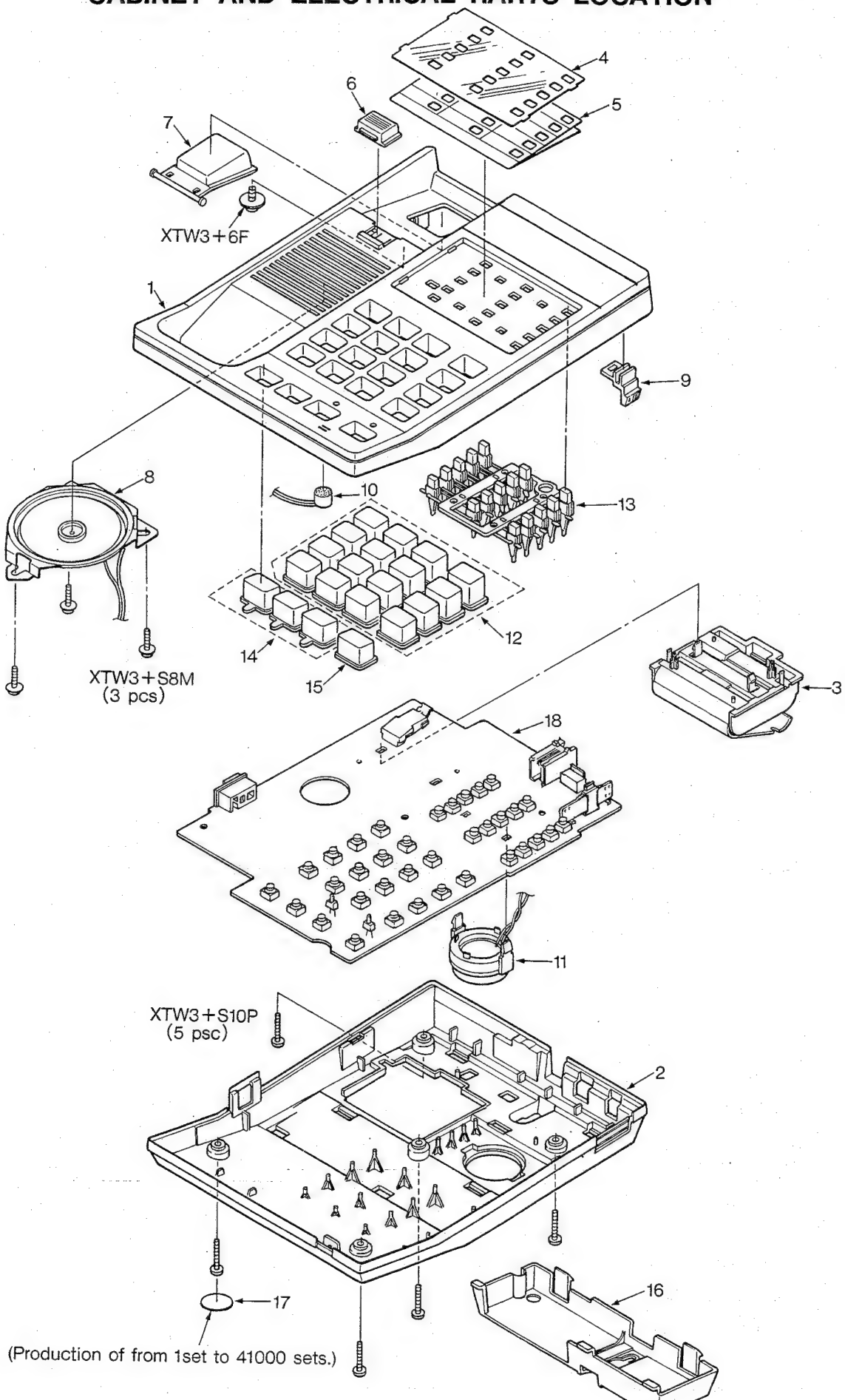


Fig.14

REPLACEMENT PARTS LIST

Model KX-T2355

Notes:

1. Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.
2. Important safety notice.
   Components identified by the ⚠ mark special characteristics important for safety. when replacing any of these components, use only manufacture's specified parts.
3. The S mark indicates service standard parts and may differ from production parts.
4. RESISTORS & CAPACITORS
   Unless otherwise specified.
   All resistors are in ohms(Ω) k=I000Ω,M=I000kΩ
   All capacitors are in MICRO FARADS(μF) P=0.001 μF
   *Type &Wattage of Resistor
   Type

ERC:Solid	ERX:Metal Film	PQ4R:Carbon
ERD:Carbon	ERG:Metal Oxide	ERS:Fusible Resistor
PQRD:Carbon	ERO:Metal Film	ERF:Cement Resistor

Wattage

10,16:1/8W	14,25:1/4W	12:1/2W	1:1W	2:2W	3:3W

*Type & Voltage of Capacitor
Type

ECFD:Semi-Conductor	ECCD,ECKD,ECBT,PQCBC : Ceramic
ECQS:Styrol	ECQE,ECQV,ECQG : Polyster
PQCUV:Chip	ECEA,ECSZ : Electrolytic
ECQMS:Mica	ECQP : Polyproplylene

Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others	
1H: 50V	05: 50V	OF:3.15V	OJ :6.3V	1V :35V
2A:100V	1:100V	1A:10V	1A :10V	50,1H:50V
2E:250V	2:200V	1V:35V	1C :16V	1J :63V
2H:500V		OJ:6.3V	1E,25:25V	2A :100V

Ref. No.	Part No.	Part Name & Description		Pcs	
		INTEGRATED CIRCUITS, TRANSISTORS & DIODES			
IC1	PQVI452N9681	IC		1	
IC2	PQVISC77655S	IC		1	
IC3	PQVIIR3N34A	IC		1	
IC4	AN6562	IC	S	1	
Q1	2SA1626	Transistor(Si)		1	⚠
Q2	2SD662B	Transistor(Si)		1	⚠
Q3	2SC2120	Transistor(Si)	S	1	
Q4	PQVTBB1A4M	Transistor(Si)		1	
Q5,6,8,9 ,17,18	2SC1740S	Transistor(Si)		6	
Q7, 12, Q15,16	DTA144A 2SA937	Transistor(Si) Transistor(Si)	S S	2 2	
Q11	PQVTBB1J3P	Transistor(Si)		1	
Q14	DTC144A	Transistor(Si)	S	1	
D1-4, 7-9 ,12-14,18 ,20,21,23 ,27,28,31	1SS131	Diode(Si)	S	17	⚠
D5	MA4300	Diode(Si)	S	1	⚠
D6	PQVDS1YB40F1	Diode(Si)		1	⚠
D10	MA4180	Diode(Si)		1	⚠
D11	MA7062	Diode(Si)		1	⚠
D15	MA700	Diode(Si)		1	
D17,24	MA161	Diode(Si)	S	2	
D19	PQVD05AZ3.0	Diode(Si)		1	
D29,30	LN22RPH	LED		2	
		JACKS			
JJ1	PQJJ1TA11Z	Jack, Telephone		1	
JJ2	PQJJ1TB10Z	Jack, Handset		1	

Ref. No.	Part No.	Part Name & Description		Pcs	
		SWITCHES			
SW1	ESE14A211	Switch, Hook		1	
SW2	PQSS2A27W	Switch, Tone/Pulse		1	
SW3	PQSS3A17W	Switch, Ringer		1	
ST1-14, STL	EVQ-QS205K	Switch, Memory Station, Lower		15	
ST15-34	PQSH1A33Z	Switch, Dialing, Flash, Mute, Hold, etc...		20	
		CABINET AND ELECTRICAL PARTS			
1	PQKM133Y8	Upper Cabinet		1	
2	PQYF1020Y7	Lower Cabinet Assembly		1	
3	PQWBT2365M	Battery Case Assembly		1	
4	PQHR5084Z	Transparent Cover		1	
5	PQHP596Y	Telephone Card		1	
6	PQKE46Z	Handset Holder		1	
7	PQBE18Z	Button, Hook		1	
8	PQAS65P06V	Speaker		1	
9	PQBD100Z	Knob, Volume		1	
10	PQJM117Z	Microphone		1	
11	PQWHT2365M	Buzzer Assembly		1	
12	PQBCX67Z	Button, 16 Key		1	
13	PQBCX68Z	Button, 15 Key		1	
14	PQBCX69Z	Button, FLASH/ MUTE/ HOLD		1	
15	PQBC183Z	Button, Speakerphone		1	
16	PQYL1003Z7	Stand Assembly		1	
17	PQHR5117Z	Sheet		1	
18	PQWPT2355M	P.C.Board Assembly (NLA)		1	
		HANDSET PARTS			
H1	PQJX2PR404W	Handset Assembly		1	
H1-1	PQYM2PR404W	Lower Cabinet Assembly		1	
H1-2	PQKF110Z83	Upper Cabinet		1	
H1-3	PQWHJX404W	Speaker Assembly		1	
H1-4	PQWMJX404W	Microphone Assembly		1	
H1-5	PQHG695W	Rubber Cap		2	
		OTHERS			
SA1	PQVDSAE310	Varistor (Surge Absorber)		1	⚠
CF1	PQVBB480E1	Ceramic Filter		1	
VR1	PQVAL204B24A	Volume Control, 20kΩ(B)		1	
VR2	PQNB3A00B24M	Semi-Fixed, Variable Resistor 20kΩ(B)		1	
		ACCESSORIES			
A1	PQJA30M	Handset Cord		1	
A2	PQJA59Y	Telephone Cord	S	1	
A3	PQQX5553Z	Instruction Book		1	
		PACKING MATERIALS			
P1	PQPN829Z	Pad		1	
P2	PQPP34Z	Protection Cover (for Accessories)		1	
P3	XZB26X40A01	Protection Cover (for Set)		1	
P4	PQPH75Z	Protection Cover (for Handset)		1	
P5	PQPK591Z	Gift Box		1	

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
		RESISTORS			
R1	ERDS1TJ622	6.2k ⚠	R53		
R2	ERD16TJ103	10k		Not Used	
R3	ERD16TJ334	330k	R56		
R4	ERD16TJ124	120k	R57	ERD16TJ104	100k
R5	ERD16TJ392	3.9k	R58	Not Used	
R6	ERD16TJ103	10k	R59	ERD16TJ103	10k
R7	Not Used		R60	ERD16TJ822	8.2k
R8	ERD16TJ683	68k ⚠	R61	ERD16TJ472	4.7k
R9	ERD16TJ104	100k ⚠	R62	ERD16TJ153	15k
R10	ERD16TJ472	4.7k ⚠	R63	ERD16TJ473	47k
R11	ERD25TJ390	39 ⚠	R64	ERD25TJ124	120k
R12	ERD16TJ104	100k	R65	ERD16TJ223	22k
R13	Not Used		R66	ERD16TJ473	47k
R14	ERD16TJ471	470	R67	ERD16TJ153	15k
R15	ERD16TJ821	820	R68	ERD16TJ101	100
R16	ERD16TJ102	1k	R69	Not Used	
R17	ERD16TJ153	15k	R70	Not Used	
R18	ERD16TJ330	33	R71	ERD16TJ183	18k
R19	ERD16TJ150	15	R72	ERD16TJ562	5.6k
R20	ERD16TJ335	3.3M	R73	Not Used	
R21	ERD16TJ472	4.7k	R74	ERD16TJ394	390k
R22	ERD16TJ470	47	R75	ERD16TJ103	10k
R23	ERD16TJ4R7	4.7	R76	ERD16TJ103	10k
R24	ERD16TJ222	2.2k	R77	ERD16TJ153	15k
R25	ERD16TJ105	1M	R78	ERD16TJ473	47k
R26	ERD16TJ102	1k	R79	ERD16TJ154	150k
R27	ERD16TJ105	1M	R80	ERD16TJ154	150k
R28	ERD16TJ105	1M	R81	ERD16TJ104	100k
R29	ERD16TJ105	1M	R82	ERD16TJ103	10k
R30	ERD16TJ824	820k	R83	ERD16TJ472	4.7k
R31	ERD16TJ104	100k	R84	ERD16TJ103	10k
R32	ERD16TJ104	100k	R85	ERD16TJ224	220k
R33	ERD16TJ225	2.2M	R86	ERD16TJ104	100k
R34	ER016CKF3012	30.1k	R87	Not Used	
R35	ERD16TJ683	68k	R88	ERD16TJ335	3.3M
R36	ERD16TJ222	2.2k	R89	ERD16TJ182	1.8k
R37	ERD16TJ275	2.7M	R90	ERD16TJ560	56
R38	ERD16TJ275	2.7M	R91	ERD16TJ822	8.2k
R39	ERD16TJ472	4.7k	R92	ERD16TJ102	1k
R40	ERD16TJ183	18k	R93	ERD16TJ561	560
R41	ERD16TJ222	2.2k	R94	ERD16TJ561	560
R42	ERD16TJ104	100k	R95	ERD16TJ100	10
R43	ERD16TJ473	47k	R96	ERD16TJ332	3.3k
R44	ERD16TJ105	1M	R97	ERD16TJ105	1M
R45	ERD16TJ473	47k	R98	ERD16TJ105	1M
R46	ERD16TJ222	2.2k	R99	Not Used	
R47	ERD25TJ474	470k	R100	ERD25TJ182	1.8k
R48	ERD25TJ335	3.3M	R101	ERD16TJ103	10k
R49	ERD16TJ105	1M	R102	ERD16TJ103	10k
R50	ERD16TJ473	47k	R103	ERD16TJ103	10k
R51	ERD16TJ682	6.8k	R104	ERD16TJ103	10k
R52	ERD16TJ103	10k	R105	ERD16TJ102	1k
		CAPACITORS			
C1	ECQE2105KS	1 ⚠	C17	ECFD1E473MD	0.047
C2	ECEA1HU100	10 ⚠	C18	PQCBC1C103MY	0.01
C3	ECEA1HUR22	0.22	C19	ECFD1E153MD	0.015
C4	ECQG1H822JZ	0.0082	C20	ECEA0JU102	1000
C5	Not Used		C21	ECFD1C104MD	0.1
C6	ECKD2H681KB	680P ⚠	C22	ECFD1E153MD	0.015
C7	ECKD2H681KB	680P ⚠	C23	ECFD1C104MD	0.1
C8	ECKD1H103MD	0.01 ⚠	C24	ECEA1EU470	47 S
C9	ECFD1C333MD	0.033	C25	ECFD1C683MD	0.068
C10	ECEA1AU470	47	C26	PQCBC1C103MY	0.01
C11	PQCBC1H681KB	680P	C27	ECFD1C683MD	0.068
C12	ECEA1HU3R3	3.3	C28	ECEA1HU010	1
C13	ECFD1C104MD	0.1	C29	ECEA1HU010	1
C14	ECEA0JU331	330	C30	ECEA1EU4R7	4.7
C15	Not Used		C31	ECFD1C683MD	0.068
C16	ECEA1HKS0R1	0.1	C32	PQCBC1C103MY	0.01

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
C33	ECEA1HU220	22 S	C50	ECEA1EU470	47 S
C34	ECEA1EU4R7	4.7	C51	Not Used	
C35	ECFD1C104MD	0.1	C52	Not Used	
C36	ECEA1EU470	47 S	C53	ECEA1CKS100	10
C37	ECFD1C104MD	0.1	C54	Not Used	
C38	ECEA1AU101	100 S	C55	ECEA1HU0R1	0.1
C39	ECEA1AU101	100 S	C56	ECEA1EU470	47 S
C40	ECFD1C104MD	0.1	C57	ECFD1C104MD	0.1
C41	PQCBC1C103MY	0.01	C58	PQCBC1H101KB	100P
C42	ECFD1E473MD	0.047	C59	PQCBC1H101KB	100P
C43	ECEA1CU221	220	C60	ECEA1AU221	220 S
C44	Not Used		C61	Not Used	
C45	ECFD1E473MD	0.047	C62	ECEA1HUR33	0.33
C46	ECFD1C683MD	0.068	C63	Not Used	
C47	ECFD1C104MD	0.1	C64	ECKD1H222KB	0.0022
C48	ECFD1E473MD	0.047	C65	ECEA1HKS0R1	0.1
C49	ECEA1CKS100	10	C66	PQCBC1C103MY	0.01
			C101	PQCBC1C103MY	0.01

OPERATIONS

Hold

To Place a Call on Hold

While having a conversation,

Push [HOLD].

- The Hold Indicator will blink slowly.
- You may hang up the handset.

To Release a Hold

1 ■ **When the handset is lifted;**

Push [HOLD] again.

■ **When the handset is on the cradle;**

- In using the handset;
  Lift the handset.

  or
- In the hands-free mode;

Push [SP-PHONE].

2 Start talking.

Connecting Another Telephone in Parallel

To release a hold using another telephone connected on the same line:

Lift the handset of the other telephone.

Hands-free

Switching to Hands-free or Handset during a Conversation

You may choose to use the handset or hands-free.

Hands-free ➡ Handset
Switch to

Lift the handset.

- The SP-PHONE Indicator will go out.

Handset ➡ Hands-free
Switch to

1 Push [SP-PHONE].

- The SP-PHONE Indicator will light.

2 Hang up the handset.

■ Before hanging up, you must push the SP-PHONE button.

Helpful Hints for Hands-free

■ **If the other party finds it difficult to hear your voice:**
Lower the sound level using the Volume Control or speak louder.

■ **Absorbing echoes:**
Use in a room that has curtains or carpeting.

■ **Note:**
If you and the caller speak at the same time, parts of your conversation will be lost.
To avoid this, spaek alternately.

Automatic Dialing

Each Memory button consists of two functions, they are upper and lower memory locations. Each location (Upper+Lower) is capable of storing 16 digits.

Storing Phone Numbers

Be sure the handset is on the cradle, the SP-PHONE button is off and batteries are installed

1 Push [PROG] until the Memory Indicator lights.

2 ■ **Home Use (into the upper)**

Push [Station button] ➡ [1] ··· [PRS 7] ➡ [MEMORY].
Phone no.

■ **Office Use (PBX) (into the lower)**
Depressing the Lower Station button must be done first.

Push [LOWER] ➡ [Station button] ➡ [WXY 9] ➡ Line access no.

[PAUSE SAVE] ➡ [1] ··· [PRS 7] ➡ [MEMORY].
Phone no.

3 After storing all the numbers,

Push [PROG].

■ 28 telephone numbers, up to 16 digits each, can be stored in the upper and lower memory stations.

■ To change a stored number, repeat the steps of "Storing Phone Numbers".

Dialing

1 **Lift the handset.**
or
In hands-free mode: Push [SP-PHONE].

2 ■ In using the upper station, Push [Station button].

■ In using the lower station, Push [LOWER] ➡ [Station button].

3 When you finish, hang up the handset or Push [SP-PHONE].

Correcting an Error while Storing

If you notice an error before pushing the Memory button:

1 Push [CLEAR].

- The new entry is cleared and the previous storage remains untouched.

2 Repeat step 2 of "Storing Phone Numbers".

■ Even while programming numbers, you can answer a call by simply lifting the handset. Programming is cancelled and then reprogramming shall be done.

Y ⓢ M
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ORDER NO. KM4891208SS1
F1

Service Manual

Supplement - 1

Telephone Equipment

KX-T2355

EASA-PHONE®

iTS Integrated Telephone System

Please use this manual together with the service manual for model No. KX-T2355, order No. KM48802633C1.

CHANGES

■ REPLACEMENT PARTS LIST

Interchangeability Code			See the Notes column on the following part number list.
	Parts	Set Production	
A	Original → Early New → Late		Original or new parts may be used in early or late production set. Use original parts until exhausted, then stock new parts.
B	Original → Early New → Late		Original parts may be used in early production sets only. New parts may be used in early or production sets. Use original parts where possible, then stock new parts.
C	Original → Early New → Late		New parts only may be used in early or late production sets. Stock new parts.
D	Original → Early New → Late		Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.
E Addition	F Deletion	G Correction	H Other

Ref. No.	Part Name & Description	Original Part No.	New Part No.	Pcs	Remarks	Note
IC3	IC	PQVIIR3N34A	**PQVIBA6565A**	1	*2	D
Q18	Transistor (Si)	2SC1740S	--------	0	*1	F
D8	Diode (Si)	1SS131	--------	0	*1	F
D29,30	LED	LN22RPH	**LN221RPH**	2		G
2 ,	Lower Cabinet Assembly	PQYF1020Z7	**PQYF1027Y7**	1		A
6 ,	Handset Holder	PQKE46Z	**PQKE46Y**	1		A
16 ,	Stand Assembly	PQYL1003Z7	**PQYL1003X7**	1		A
H1	Handset Assembly	PQJX2PR404W	**PQJX2PR403Y**	1	*1	D
H1-1	Lower Cabinet	PQYM2PR404W	**PQKM121U83**	1	*1	D
H1-2	Upper Cabinet	PQKF110Z83	**PQKF104Z83**	1	*1	D
H1-3	Speaker	PQWHJX404W	**PQAX4P03Z**	1	*1	D
H1-4	Microphone Assembly	PQWMJX404W	**PQWMJX403Y**	1	*1	D
H1-6	Weight	———	**PQHM32Y**	1	*1	E
SA1	Varistor (Surge Absorber)	PQVDSAE310	**PQVDSAE310F1**	1		A
R2	Resistor, 12kΩ	ERD16TJ103	**ERDS2TJ123**	1	*2	D
R6	Resistor, 10kΩ	ERD16TJ103	--------	0	*2	F
R22	Resistor, 100Ω	ERD16TJ470	**ERDS2TJ101**	1	*1	D
R34	Resistor, 30kΩ	ER016CKF3012	**ERDS2TJ303**	1	*1	D
R88	Resistor, 3.3MΩ	ERD16TJ335	--------	0	*1	F
R89	Resistor, 1.8kΩ	ERD16TJ182	--------	0	*1	F
R90	Resistor, 56Ω	ERD16TJ560	--------	0	*1	F
C17	Capacitor, 0.033μF	ECFD1E473MD	**ECFD1C333KD**	1	*1	D
C19	Capacitor, 0.015μF	ECFD1E153MD	--------	0	*1	F
C32	Capacitor, 0.01μF	PQCBC1C103MY	--------	0	*1	F
C35	Capacitor, 0.0047μF	ECFD1C104MD	**ECFD1E472KD**	1	*1	D
C36	Capacitor, 100μF	ECEA1EU470	**ECEA1AU101**	1	S	B
C53	Capacitor, 10μF	ECEA1CKS100	--------	0	*1	F
C65	Capacitor, 0.1μF	ECEA1HKS0R1	--------	0	*1	F

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Notes:

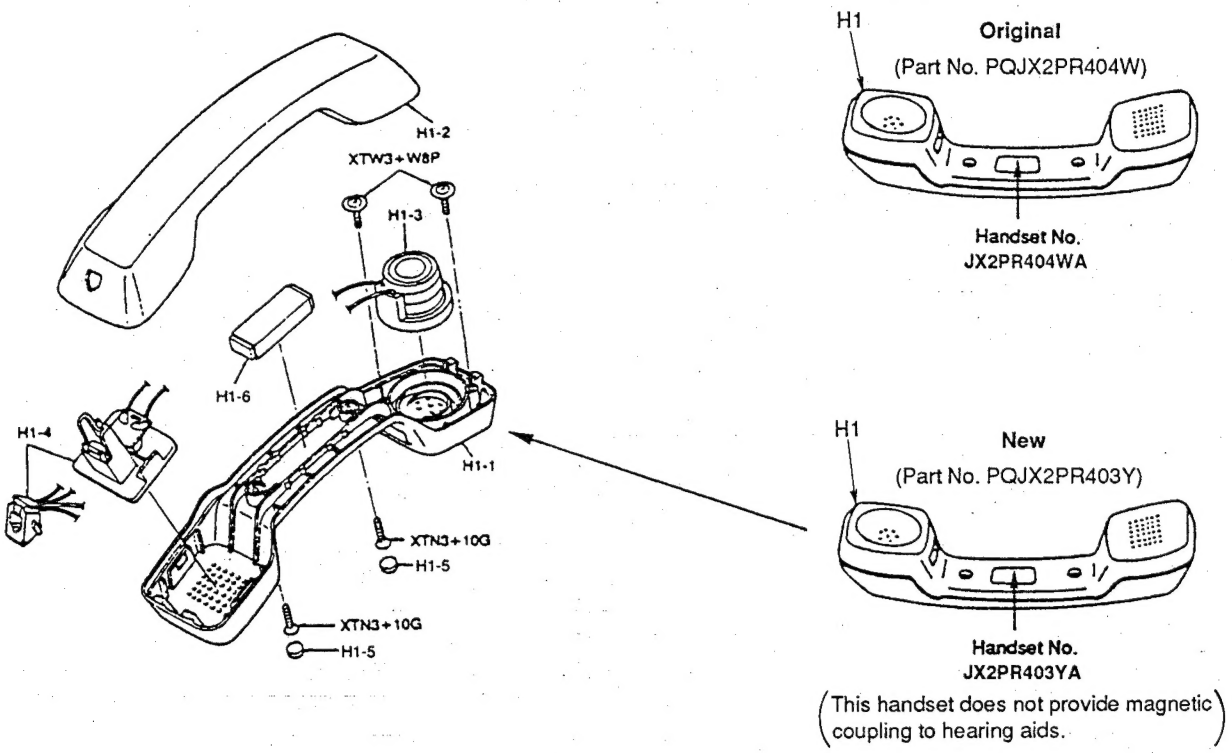
1. Parts of *1 marks has been changed at the same time. (Change of handset...Production of Aug. 1988 ~ Jun. 1989.)

Suffix B [8 H A Q B 1 2 3 4 5] ← Serial No. Label (Bottom of the unit)

2. Parts of *2 marks has been changed at the same time.

Suffix C [8 H A Q C 1 2 3 4 5] ← Serial No. Label (Bottom of the unit)

■ HANDSET PARTS LOCATION



Notes:

1) We intend to supply replacement handset (PQJX2PR403Y) after the extinction of PQJX2PR404W stock, because the handset (PQJX2PR404W) can not be produced.
2) When replacing the handset assembly (H1) from PQJX2PR404W to **PQJX2PR403Y**, replace the resistors (R22, R34, R88, R89 and R90) from original parts to new parts and capacitors (C17, C19, C32, C35, C53 and C65) from original parts to new parts, and remove the Q18, D8 at the same time.

I Ⓕ KX-T2355(M)
Printed in Japan

SERVICE BULLETIN

Product:	Telephone
Number:	F01/F05-91-2
Date:	August 1991

Matsushita Services Company
Technical & Administrative Services Division

Division Of Matsushita Electric
Corporation Of America
50 Meadowland Parkway
Secaucus, New Jersey 07094

Model:

ALL MODELS. CONSUMER AND KEY SYSTEM TELEPHONES

COPY AND FILE THIS BULLETIN (S) WITH THE RESPECTIVE SERVICE MANUAL MODEL (S)

Symptom: Dead receiver (ear piece) on handset.

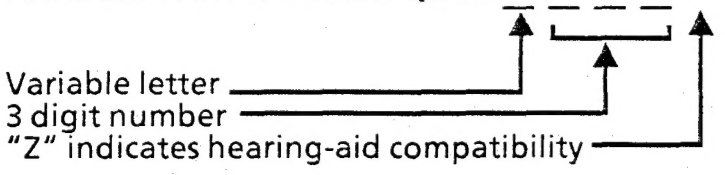
Cause: A) The strength of the glue to which the Hearing-Aid coil is mounted weakens and detaches when the handset is subjected to abnormal shocks, such as dropping from high places or vibration.

B) The soldering period (heat applied) to the coil lead and the terminal was too long. Due to this, the coil lead (soldering position) becomes thin and breaks when dropped or vibrated.

Remedy: Replace the handset ear piece with a new improved Part Number PQAX4P03Y.

NOTE: FOR FUTURE PRODUCTION THE FACTORY WILL USE THE NEW IMPROVED EAR PIECE. THE IMPROVED EAR PIECE WILL HAVE A STAMPED FOUR DIGIT NUMBER GREATER THAN 9025.

THIS SERVICE BULLETIN APPLIES TO ALL HANDSET FOR CONSUMER AND BUSINESS MODEL PHONES THAT ARE HEARING-AID COMPATIBLE, WITH HANDSET PART NUMBER PQJX2P _ _ _ _ Z



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Dist: F01/F05, 81, W-994